



*Journal*  
of the  
**HARDY ORCHID SOCIETY**

**Vol. 9 No. 2 (64) April 2012**

## The Hardy Orchid Society

Our aim is to promote interest in the study of Native European Orchids and those from similar temperate climates throughout the world. We cover such varied aspects as field study, cultivation and propagation, photography, taxonomy and systematics, and practical conservation. We welcome articles relating to any of these subjects, which will be considered for publication by the editorial committee. Please send your submissions to the Editor, and please structure your text according to the "Advice to Authors" (see website [www.hardyorchidsociety.org.uk](http://www.hardyorchidsociety.org.uk), January 2004 Journal, Members' Handbook or contact the Editor). Views expressed in journal articles are those of their author(s) and may not reflect those of HOS.

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**Plant Show Secretary:** David Hughes, Linmoor Cottage, Highwood, Ringwood, Hants., BH24 3LE [davidcchughes@talktalk.net](mailto:davidcchughes@talktalk.net)

**Journal Editor and Website:** Mike Gasson, Moor End Cottage, Moor End, Stibbard, Norfolk, NR21 0EJ [moorend@globalnet.co.uk](mailto:moorend@globalnet.co.uk)

**Southern Meetings Organiser:** Betty Barber, 8 Dean Close, Deeds Grove, High Wycombe, Bucks., HP12 3NS [betty.barber@gmail.com](mailto:betty.barber@gmail.com)

**Northern Meeting Organiser:** Ken Kitchen, Kinncraig, Stonycroft Drive, Arnside, Carnforth, LA5 0EE [knak@kenak.plus.com](mailto:knak@kenak.plus.com)

**Publicity Officer:** Simon Tarrant, Bumbys, Fox Road, Mashbury, Chelmsford, CM1 4TJ [s.tarrant@virgin.net](mailto:s.tarrant@virgin.net)

**Seed Bank:** Alan Leck, 61 Fraser Close, Deeping St. James, Peterborough, PE6 8QL [alanleck@alanleck.plus.com](mailto:alanleck@alanleck.plus.com)

**Journal Distributor:** Iain Wright, The Windmill, Vennington, Westbury, Shrewsbury, Shropshire, SY5 9RG [iaincwright@tiscali.co.uk](mailto:iaincwright@tiscali.co.uk)

**Conservation:** Bill Temple, Primrose Cottage, Hanney Road, Steventon, Oxon., OX13 6AP [bill@billtemple.f9.co.uk](mailto:bill@billtemple.f9.co.uk)

**Field Meetings Co-ordinator:** Malcolm Brownsword, 14 Manor Close, West Hagbourne, Didcot, Oxfordshire, OX11 0NQ [malcolm.brownsword@tesco.net](mailto:malcolm.brownsword@tesco.net)

## Front Cover Photograph

*Ophrys apifera* var. *bicolor* by Paul Harcourt Davies - see article on page 51.

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## Editorial Note

With the growing level of interest in seed germination within the society, it is especially helpful that John Haggard has contributed an article in this issue sharing his experience and expertise. Note that John will again be playing a key role in the 2012 seed sowing workshop on 19<sup>th</sup> August.

At the 2011 Leeds Meeting, Alan Gendle presented an interesting talk on *Dactylorhiza* hybrids and has followed this up with an article. It is good to have some expert analysis of this difficult group of orchids and the article is a useful written version that should also interest many who were unable to be at the meeting.

The promised contribution from Paul Harcourt Davies is also included and this time he focuses on the taxonomic controversies associated with *Ophrys*. The associated cover photograph is of interest as it exposes one of the creative photographic techniques that Paul has included in a new book. Anyone interested in macro-photography should learn some new skills and enjoy "*Digital Close-Up Photography Q&A*" published by Lark and currently available on Amazon for under £10!

## Additional Field Trips

**Monday 4<sup>th</sup> June: Kent** - for *Ophrys fuciflora*, *Orchis anthropophora* & other orchids.

**Saturday 9<sup>th</sup> June: Essex** - Chafford Hundred for many orchids & other rare plants.

For both contact Mike Parsons [mikeparsons30@talktalk.net](mailto:mikeparsons30@talktalk.net)

## Chairman's Note Celia Wright

By the time you read this, I hope that spring will be with us, with the start of so much to enjoy in the world of hardy orchids. For those growing plants, the winter dormant species will soon be showing their noses above the ground, even those outside in the garden. I'm looking forward to seeing a good number of plants at Kidlington on 22<sup>nd</sup> April. Don't forget that you can bring one or more plants for the noncompetitive section if you'd like others to see them without the need to compete. If you can, letting David Hughes know in advance allows him to plan the space.

The programme and booking form for the AGM and Spring Meeting are enclosed with this Journal. Looking ahead to our second (autumn) Kidlington meeting in 2012, we shall again be welcoming Jean Claessens and Jack Kleynen who gave such wonderful talks at Leeds in 2011. I know that a number of our southern members were sorry to have missed their presentation, so they're coming back with a new pair of lectures in November. They will be able to bring pre-ordered copies of their book, "*The Flower of the European Orchid*". You contact them via their website [www.europeanorchids.com](http://www.europeanorchids.com), explaining on the contact form notes that this is to be delivered and paid for at Kidlington. Anyone who does not have internet access can ask me to order a copy for them for collection at the meeting. With their consent, HOS now have some of Jean and Jacques's superb photos on a new publicity poster on pollination.

Looking ahead, our autumn southern meeting will remain at Kidlington for the next couple of years at least, unless someone can suggest a suitable alternative nearer our original Wisley venue. We need space for the photographic competition as well as plant sales and lunch, in addition to good facilities for the talks with enough space for at least 100 participants. Anyone with any suggestions should contact me as soon as possible as Betty needs to book the 2013 date in the next couple of months.

We plan to hold our third seed sowing workshop on Sunday 19<sup>th</sup> August in Oxfordshire. This is becoming an annual fixture as the feedback from participants has been overwhelmingly positive. Everyone goes home with some plated orchid seeds so growing starts straight away. These workshops are available to members only with the cost kept as low as possible so that we just cover expenses. Contact Alan Leck if you're interested.

I hope to see as many of you as possible in 2012, but if you can't come to a meeting, do email or phone me with any ideas you have for HOS activities – 01743 884576 or [celia.wright@tiscali.co.uk](mailto:celia.wright@tiscali.co.uk).

## Identifying Hybrid Orchids

Alan Gendle

With 32 species of orchid identified in Cumbria, the potential for hybridisation is significant. To date 18 hybrids have been recorded, a mixture of bi-generic and intra-generic, and identifying them can be challenging. Hybrids can often be identified simply on a presumption – two species of orchid growing in close proximity with orchids that display some of the morphological features of both species but clearly are not either species. Careful observation should be made to ensure the suspect hybrid is not in fact only a morphological variant of one of the species.

Although hybrids can often be identified from a series of images, examination in the field with a good descriptive orchid guide, such as those provided by A & S Harrap or Foley & Clarke can be more effective. Field study allows the additional senses of touch and smell to be utilised. If plants are taller than either of the suspected parents, it could be an indication of the vigour often associated with hybridisation.

A comprehensive examination of all the morphological features of any suspected hybrid needs to be made from the ground upwards. Starting with the leaves, shape, colour, markings and attitude of the sheathing and non sheathing leaves need careful examination. For example *Dactylorhiza fuchsii* and *D. maculata* have only a slight variation in the number of sheathing and non sheathing leaves but *fuchsii* leaves have heavy blotches on them. *D. maculata* exhibits much finer dots and the leaves are much narrower than those of *D. fuchsii*.

The sense of touch can be used to gently squeeze the stem. The Marsh-orchids, i.e. *Dactylorhiza purpurella*, *D. praetermissa*, *D. incarnata* or *D. traunsteinerioides*, all have hollow stems. The Spotted-orchids, such as *Dactylorhiza fuchsii* and *D. maculata*, have solid stems. A stem that is only partly compressible would be one possible indicator suggesting a Marsh × Spotted-orchid hybrid. The shape and density of the inflorescence, shape, colour, size and markings of the flowers and spur dimensions are also key indicators which prove useful in identifying hybrids. Plants exhibiting long thin nectiferous spurs, a characteristic of *Gymnadenia*, but having a labellum with patterning, is undoubtedly a hybrid with a *Dactylorhiza* of some sort. This hybrid, a *Dactylodenia*, will, to some degree, have a detectable fragrance characteristic of *Gymnadenia*.

The features mentioned above are discussed in more detail in the notes accompanying the following parent and hybrid images. The pictures, taken in Cumbria, illustrate how some of the morphological features of the parent plants can be seen in the resulting hybrid. My thanks to Richard Bateman for his comment and advice over the preparation of this article.





**Fig. 1: Northern Marsh-orchid**

*Dactylorhiza purpurella*

Leaves dark green, held at 45° to the stem, occasionally heavily spotted in Cumbria. The inflorescence tends to be flat topped and dense. Flowers are a distinct deep magenta colour, lip is usually spade-shaped but can have flat side sections. A pattern of darker loops, dots and swirls covers the lip. The spur is short and fat.

**Fig. 2: Early Marsh-orchid**

*Dactylorhiza incarnata* ssp. *incarnata*

Leaves are broad, held at 45° to the stem, keeled, hooded at the tip and pale green. The flowers are small, whitish to pale pink. The centre is covered by small pink dots enclosed by a single loop. There is a clear distinct border between the loop and the edge of the lip. The lip has a squared off bottom edge with a small central lobe and is heavily folded backwards.

**Fig. 3: Early Marsh-orchid**

*Dactylorhiza incarnata* ssp. *pulchella*

The leaves of *pulchella* tend to be held erect and can reach the base of the inflorescence. They are slightly darker than those of *D. incarnata* ssp. *incarnata*. The lip has a darker background colour, has a series of darker loops and is less folded than ssp. *incarnata*.

**Fig. 4: Northern × Early Marsh-orchid**

(*D. incarnata* ssp. *incarnata*)

*Dactylorhiza* × *latirella*

This hybrid was part of a group found growing with both parents. The morphological features are those of *D. purpurella* but the pale colour has come from *D. incarnata* ssp. *incarnata*.

**Fig. 5: Northern × Early Marsh-orchid**

(*D. incarnata* ssp. *pulchella*)

*Dactylorhiza* × *latirella*

Inflorescence shape and size as *purpurella*, flowers small, shape nearer *incarnata* than *purpurella*, same for leaves (local *purpurella* have spotted leaves as does the hybrid).

**Fig. 6: Chalk Fragrant-orchid**

*Gymnadenia conopsea*

Lax flower spike, lateral sepals at 45° below horizontal, lip wider than long, pale pink unmarked. Long, thin, downward-curving spur









**Fig 7: Common Spotted-orchid**  
*Dactylorhiza fuchsii*

Leaves broad, marked with blotches. Inflorescence cylindrical to pyramidal, dense. Lip 3-lobed, centre one longer than side lobes. Background colour white to pink, pattern of darker coloured loops. Spur short, tapering towards the tip.

**Fig. 8: Common Spotted-orchid × Chalk**  
**Fragrant-orchid**

×*Dactyloдения legrandiana*

Lip shape is intermediate between *D. fuchsii* and *G. conopsea*. Has faint markings of *fuchsii* and long thin spur and fragrance of *conopsea*, lateral sepals as *conopsea*.

**Fig: 9: Heath Fragrant-orchid**  
*Gymnadenia borealis*

Short plant 10 to 25 cm tall, few upright narrow leaves, unspotted. Small dense flower spike. Lip unmarked, pink, longer than broad, weakly 3-lobed.

**Fig. 10: Northern Marsh-orchid × Heath**  
**Fragrant-orchid** ×*Dactyloдения varia*

Overall shape and lip shape, patterning as *D. purpurella*, lip colour paler than *D. purpurella*. Spur is key indicator, fat like *D. purpurella* but as long as *G. borealis*. Hybrid has strong *G. borealis* fragrance.

**Fig. 11: Northern Marsh-orchid × Heath**  
**Fragrant-orchid** ×*Dactyloдения varia*

Same hybrid as Fig 10 but morphologically more like *G. borealis* tall, spindly plant. Small flowers, lip shape intermediate between parents, colour and pattern like *D. purpurella*, spur long and fat with fragrance.

**Figs. 12: Heath Spotted-orchid**  
*Dactylorhiza maculata*

Leaves narrow, keeled, erect to arching, fine spots. Inflorescence shape pyramidal to rounded. Lip broad, rounded with small central tooth. The patterning can vary from solid loops to fine dashes or any combination between.



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12





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**Fig. 13: Heath Spotted-orchid**

*Dactylorhiza maculata*

Leaves narrow, keeled, erect to arching, fine spots. Inflorescence shape pyramidal to rounded. Lip broad, rounded with small central tooth. The patterning can vary from solid loops to fine dashes or any combination between.

**Figs. 14 & 15: Heath Spotted-orchid ×**

**Heath Fragrant-orchid**

×*Dactyloдения legrandiana*

Both hybrid flowers display the patterning illustrated in Figs 12 & 13. The spur is a long, downward pointing and nectariferous, but physically the plant displays the characteristics of the heath spotted orchid; the lateral sepals are held erect at 45° to the horizontal.

**Fig. 16: Pugsley's Marsh-orchid**

*Dactylorhiza traunsteinerioides*

Small plant, typically 10 to 15 cm tall in Cumbria. Leaves fairly heavily marked with dark blotches, upright. Flower spike tends to be one sided; few flowers, deep crimson, 3-lobed, triangular with distinct central tooth, bearing a pattern of loops.

**Fig. 17: Pugsley's Marsh-orchid × Heath Spotted-orchid**

*Dactylorhiza ×jenensis*

Leaves, long, erect, spotted, much paler than Pugsley's marsh orchid. Inflorescence as heath spotted but the lip shape is intermediate between the two parents.

**Fig. 18: Small White-orchid**

*Pseudorchis albida*

Leaves few, broad, shiny almost oval. Dense long inflorescence, of very small creamy white flowers that are 3-lobed, centre lobe longer than the 2 lateral lobes. The sepals and petals form a hood.



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**Heath Fragrant-orchid × Small White-orchid**  
×*Pseudadenia schweinfurthii*

**Fig. 19:** This figure illustrates the long, thin leaves and inflorescence shape typical of the heath fragrant orchid.

**Fig. 20:** This figure illustrates the lip shape which is clearly 3-lobed, not weakly lobed or pink as in heath fragrant. The dorsal sepals are typical heath fragrant shape.



## Orchid Meadow

Website: [www.orchidmeadow.co.uk](http://www.orchidmeadow.co.uk)

e-mail: [Anthony.heys@sky.com](mailto:Anthony.heys@sky.com)

**Book Review: *Growing Hardy Orchids*  
Moira Tarrant**



*Growing Hardy Orchids* by Philip Seaton, Phillip Cribb, Margaret Ramsay & John Haggard

Paperback 978-1-84246-175-4 £10

128pp published by Royal Botanic Gardens, Kew

Publication of this book has been long anticipated as three of the authors, all of whom are renowned for expertise in their respective fields, are members of the Hardy Orchid Society (HOS). A number of other members known to us all for their skill as growers are listed in the acknowledgements. Intended by Kew as a companion volume to *Growing Orchids from Seed* by Philip Seaton and Margaret Ramsay 2005 and as an update for *Hardy Orchids; orchids for the garden and frost-free greenhouse* by Phillip Cribb and Christopher Bailes 1989, the current book is attractively presented and easy to dip into.

Using the same mix of photos and clear bold line drawings as its companion, it takes the reader through general issues such as habitat and conservation and provides greater detail on propagation by division and seed, general cultivation and pests and diseases. Four genera are then used to demonstrate differences in horticultural approach by showing their growth from seed to flowering plant. The final section provides an alphabetical directory of the important genera to be found in cultivation.

Providing an array of mouth-watering photos of a rich array of hardy orchids from around the globe is an excellent way to encourage growers to explore beyond the better-known European species, particularly when a wider range of plants is now readily available through the trade. The book also cleverly emphasises the choice that is available to growers both in where and how to grow their orchids. Successful growers can only ever tell us what has worked for them and where possible explain why. The authors readily acknowledge the need for readers to look further for more detailed advice and in this they are outstandingly generous to the HOS in their recommendation of the Society as a source of information, equipment and seed. The HOS also gets a glowing mention in the section on conservation.

The book is not, however, without its drawbacks. I am not sure what level of readership was envisaged; the language is, for the most part, simple and chatty and there is a two page glossary - "orchid language" which defines terms such as parasite and CITES. Nevertheless, description of *Listera* as being "recently included in the for-

merly holomycotrophic genus *Neottia* ... to form a monophyletic clade” might be beyond beginner growers. The order in which information is presented can provide a challenge as some information such as deflasking appears in the general section on glasshouse techniques and then again in the detailed section of raising four specific genera from seed to flowering. The moral seems to be to read right to the end so as not to lose sight of the plot.

My final concern is about level of editorial attention to detail. Several typos seem surprising in a book from an authoritative source. More immediately obvious is control of photo quality. In one or two cases the photos seem completely pointless: what is the purpose of a photo of a row of zip-top plastic bags? (The caption tells us that they contain micro propagated *Cypripedium* seedlings in a fridge). Given the quality of most of the photos within the directory of recommended genera and of pictures submitted to HOS photographic shows, it should have been possible to obtain an image of *Orchis purpurea* which is in focus. Perhaps the most unforgiveable pictorial clanger is among the photos of the authors on the back cover where that of John Haggart is not John at all but is Samuel Sprunger, the Swiss *Cypripedium* expert.

This book then is highly recommended as it is packed full of information and wisdom as one would expect from such knowledgeable authors. It is not, however, a stand-alone volume for someone seriously wishing to grow from seed to flowering. Maybe Kew expected too much when they tried to capture in a superficially populist volume what the four expert authors can each tell us about hardy orchids.



# Hidden Worlds

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## What's in a Face Paul Harcourt Davies

Sooner or later any ardent orchid lover will sit on a hillside where there are swarms of *Ophrys* and be able to marvel at what a genetic rag-bag can go past under the guise of a single supposed 'species'. The images that accompany this piece include varieties and hybrids of *Ophrys fuciflora* and *Ophrys apifera*. The *O. apifera* pictures are from various sites in 'Europe' in the widest sense. Some of those of *O. fuciflora* are from a wonderful hillside in the French Jura where there were countless spikes and little else except the occasional *Himantoglossum hircinum*. Some are orchids that grow 'just down the road' from where I live in Umbria. It is my attempt to reveal the extraordinary diversity within single 'species' and maybe make people wonder a little about 'names' given to species and the putative parentage of what is so unusual that it seems to be a 'hybrid' – or is it?

After about four decades of serious study, wandering over hillsides throughout the Mediterranean and Central Europe, I am circumspect about what I see. Yet, I read articles from so-called (and self-appointed) orchid experts (in English, French, Italian and German) who state confidently there are clearly genes of this or that *Ophrys* species present. Really: what is the evidence, how do you know what controls which bit of a labellum pattern or shape? Have those authors watched the same orchid populations over many years or even tried to hybridise artificially under lab conditions to see the result? Conjecture is one thing, but in the world of European orchids seemingly anyone can make claims and, without 'peer review', the claims pass into the literature. Utterly missing is any sense of proportion, for driven by a desire to find 'new' species, many fail to realise the potential for variation within a single, so-designated, *Ophrys* 'species'.

It is worth looking at the 'stable' ones: *Ophrys apifera*, the Bee Orchid, will often be remarkably consistent in flower morphology in one population but then in another scarcely two individuals seem identical. *Ophrys fuciflora* is a far bigger offender in this sense when it comes to finding identical individuals. I cannot claim to be a geneticist of any sort but, at one stage of life, the maths that makes up the probability theory that underlies genetics was meat and drink and a residual 'impression' remains in the few functioning brain cells left! The reality is that the portion of genetic material controlling and dictating such visually obvious characteristics as colour and shape must be very small. The named varieties *Ophrys apifera*, with sometimes extreme changes in lip morphology, reoccur in different populations suggesting that a single genetic mutation is responsible. The subsequent persistence of such variants is probably associated with the tendency of the species to self pollination, a phenomenon that probably contributes to the generally consistent morphology found in some populations. Even with a handful of mutations the potential for

variation is massive. Think of it this way – pairs of characters for light/dark, red/blue, with border/without border speculum and apex /no apex provide four sets of characters with an on/off choice. This gives  $2 \times 2 \times 2 \times 2 = 2^4$  or 16 distinct variations within a lip. Yes, this is simplistic of course but I want to try and encourage people to stop, think and be less ‘definite’ because in a DNA structure there are innumerable entities that ‘control’ and offer choices.

Since this piece was originally penned two years, ago numerous new *Ophrys* have appeared. Most recently I was sent a paper that made me groan for it split (again) the *Ophrys fuciflora* populations of the Central Italian mountains. Proliferation just does not help. Why oh why do so many within the wonder-world of European orchids never think of elegance and simplicity? It really might be time to revisit the idea of *pluralitas non est ponenda sine necessitate* or ‘plurality is not imposed without necessity’. The idea is attributed to a 14<sup>th</sup> century friar, Father William D’Ockham and is known as *Occam’s Razor*. It is, in fact, a much earlier principle but it has lasted and was later proposed in slightly different ways by both Sir Isaac Newton and the philosopher Bertrand Russell. It is not to be taken as an absolute rule – it is a guide, an heuristic principle to be used when faced with various paths to follow. As a photographer obsessed with small things, the more I look the more I find that Nature is often wonderfully ‘elegant’ with its symmetries and structures. But humans tend to complicate matters for reasons more social than scientific.

Back in the 1990’s Dr Philip Cribb and I talked at length about preparing a joint monograph on the genus *Ophrys*. It was not a great time for publishing ventures and we both had a great deal to do besides. What has deterred me since is a culture that surrounds the genus *Ophrys* that goes against every fibre of my scientific and philosophical training – that of the need to complicate. I welcomed ‘*Ophrys: the Bee Orchids of Europe*’ by Henrik Ærenlund Pederson & Niels Faurholdt. However, in a complete monograph the Turkish species need to be included as well because interesting things happen at the edges of the range. I have the images – maybe an ebook iconograph in the future, who knows?

#### Varieties of *Ophrys apifera*

Fig. 1: *Ophrys apifera* var. *chlorantha*

Fig. 2: *Ophrys apifera*

Fig. 3: *Ophrys apifera*

Fig. 4: *Ophrys apifera* var. *trollii*

Fig. 5: *Ophrys apifera* var. *trollii*

Fig. 6: *Ophrys apifera* var. *chlorantha*

Fig. 7: *Ophrys apifera* var. *jurana*

Fig. 8: *Ophrys apifera* var. *friburgensis*

Fig. 9: *Ophrys apifera* var. *bicolor*

Photos by Paul Harcourt Davies







The more I visit somewhere like Gargano (36 times and counting since 1974) the more I am convinced that, given strong populations of hymenopteran pollinators (themselves open to variation and very difficult to identify unless you work with a microscope – if you can catch them, that is) one is often looking at a snapshot. It is evolution in action, plant entities in transit. To give some small population a specific status on the basis of flimsier and flimsier character differences stretches the species concept. Hans Sundermann had the sense of this when he proposed the idea of praespecies. No, for strong philosophical and scientific reasons, I am not a fan of proliferation of species. Funny thing is I have never talked with ‘real’ botanists such as Dr Phil Cribb, Jeff Wood, Dr Alec Prigeon and Prof Richard Bateman ever to discover a secret splitter. Philip Cribb summed it up admirably in one of our many conversations over the years: Anglophone botanists tend to look for similarities and those on the continent for differences.

Interestingly, each and every one of the gentlemen mentioned is not only an orchid expert but has a profound knowledge of other aspects of botany and, moreover, the natural world. At the Glasgow WOC in 1993 I had a private contest with Alec Pridgeon to see who could get the most unlikely picture into a talk on orchids at the plenary session – he won with shots of whales. Many continental orchid writers have an interest solely

**Variation in *Ophrys fuciflora***

*Ophrys fuciflora* in Jura (Figs. 12, 13, 15 & 16)

*Ophrys fuciflora* in Central Italy (Figs. 10, 11, 18 & 20)

Fig. 15: semi-peloric form of *Ophrys fuciflora*

Photos by Paul Harcourt Davies



in orchids. Their papers are often published in journals they themselves edit and there is none of the ‘peer review’ that is traditional and absolutely essential practice in scientific journals, where papers have to stand scrutiny before they appear in print and are thus given credence. We live in a day and age where too much can appear on the Internet and be cited as ‘source’ material. In many areas of ‘pseudoscience’, charlatans are treated as experts because they are ‘quoted’. I hope rigour will triumph, for out of sloppiness come ghoulies, ghosties and all sorts of witless therapies for the gullible. Sorry, it is a pet gripe, a hobby-horse but it is driven by a background in analytical methodology.

In fact, I would propose a universal return to the idea of botanical referees and, unless these species are certified by a ‘genuine’ orchid authority e.g. a University or Botanic garden by people with a known track record, they should not be adopted. It really does any orchid enthusiast a power of good to see how one ‘species’ can vary before joining the rush to put names to each supposedly ‘distinct’ taxon and raise them to specific status. In recent years, what are little more than hybrid swarms have been thus elevated and this does not serve to clarify or simplify in any way the understanding of orchids.

When I knew I was off to Cyprus in 1978 I had no intention of returning to the UK to teach and so, with some glee, extracted what I had put into the Teacher’s Superannuation Fund. It went to buying a Bolex 16mm cine camera with which to make natural history films and a set of books. The latter were volumes by Erich Nelson and the most prized is still an autographed copy of the *Ophrys* volume – those who have seen them will know of the marvellous paintings of rows of *Ophrys* faces from different localities. Dr Nelson was not a splitter but those who came after read his books, noted the sites and went off hunting. This volume was a ready source of material and suddenly each face of *Ophrys arachnitiformis*, *Ophrys sphegodes* or *Ophrys fuciflora* became a new species and the rest is history.

Eric Nelson’s beautiful paintings of orchids first appear in a work with text by Dr Herman Fischer in 1931 on the *Orchids of Germany*. His own volume on *Ophrys* appeared in 1962 – over thirty years later when all the walking, searching and metic-

### Hybrids involving *Ophrys fuciflora* and *Ophrys apifera*

Fig. 21: *Ophrys fuciflora* × *bertolonii*

Fig. 22: *Ophrys apifera* × *fuciflora*

Fig. 23: *Ophrys fuciflora* × *sphegodes*

Fig. 24: *Ophrys fuciflora* × *bombyliflora*

Fig. 25: *Ophrys apifera* × *bertolonii*

Fig. 26: *Ophrys apifera* × *fuciflora*

Fig. 27: *Ophrys fuciflora* × *sphegodes*

Fig. 28 & 29: *Ophrys fuciflora* × *tenthredinifera*

Photos by Paul Harcourt Davies



ulous painting led to this superb monograph. He had a synoptic view of the genus gained from vast field experience: it was never a case of “Hey chaps, where shall we go for our hols this year - whoops another five orchid species”.

Just to establish a point about the capriciousness of orchids, I once took a box of slides with me as an addition to a talk I gave in Germany where I had made a number of good and knowledgeable friends. I explained that I wanted to run a little quiz and put up a series of pictures of *Ophrys sphegodes*: the task was to say which taxon they were. These were orchid folk ‘*par excellence*’ and some were much published. Their answers were consistent: *Ophrys hebes*, *Ophrys araneola*, *Ophrys aesculapii*, and so on. In fact, the pictures were all taken on the same afternoon on a well-known hillside near Dover in a very good orchid year. No one was angry, I had touched a common chord. With orchids you never stop learning they are the great deceivers and they humble us all.

As I write this in my study with a good 20cm of snow outside and rising. I gain comfort from the fact that, last week, I saw lots of orchid leaves at one local site. And now it is February and the MWGs (morons with guns) have stopped their determined slaughter of anything that flies. Hope springs eternal!

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## **Propagating orchids from seed from an amateur's perspective**

**John Haggar**

### **Introduction**

Now that "Growing Orchids from Seed" by Seaton & Ramsay has been joined on the bookshelves by "Growing Hardy Orchids" by Seaton, Cribb, Ramsay & Haggar, it should be possible for any interested members to attempt to grow their own orchids from seed. My intention in writing this article is to describe methods that may differ somewhat from those of the professionals but which may be more available or suitable for amateur growers. Furthermore, my experiences as an amateur grower have led me to put a greater or lesser importance on many details expressed in the above-mentioned publications. Producing your own orchid plants from seed can be done with minimal complications at home. Problems with access to laboratory equipment, chemicals and materials can be overcome.

It is strongly recommended that any potential home-grower associates with other amateur colleagues who have already had some success in home propagation. This is most easily achieved by joining a local enthusiasts' group or a national society such as the Hardy Orchid Society (HOS). Members can purchase materials from the HOS seed and fungus bank, obtain supplies of certain media and access a wealth of information, mainly written by successful amateur growers. The early editions of the HOS newsletter are a particularly valuable source of information for propagators with many articles telling you how to construct your own glove boxes / laminar flow cabinets, easy alternative methods of growing from seed and even a simplified way to isolate potentially symbiotic fungus from your own cultivated orchids' roots. It is hoped that all these relevant articles can be brought together and made available to HOS members as a "Growing from seed" handbook in the not too distant future.

### **Asymbiotic media and its preparation**

Svante Malmgren, a pioneer and highly successful Swedish amateur propagator, maintains that very accurately measured defined media are unnecessary for success and his own media components may be approximately measured and dissolved in (his local) mains water. The most important components of the media, in Svante's opinion, are the undefined organic additives, pineapple juice, potato or swede, for example. These need to be added in fairly exact quantities which may vary depending on the genus or species that you are trying to grow. Exactly why this is the case is not known. Undoubtedly such additives do impart plant hormones to the medium but attempts to define exactly what the active ingredients might be have been unsuccessful to date and one must conclude that unknown "undefined growth factors" must be involved.

Malmgren's original published medium containing vitamins, amino acids and pineapple juice is an excellent choice for propagating *Cypripedium calceolus*, but variations are more appropriate for other species (Malmgren 1992). *Ophrys*, for example, grows better for the most part on media that do not contain pineapple juice but swede (Swedish turnip, rutabaga) instead and some species in the genus grow much better if the amino acids are replaced with inorganic nitrogen in the form of ammonium salts and nitrates. *Orchis* species, on the other hand, tend to respond to media that contain potato in addition to the pineapple juice contained in the original formula. All these variations have been determined empirically over many years of experimentation. In all cases, however, accurate measurement and adjustment of the pH of the medium appears to be of great importance.

Thus it can be understood that many basic media that contain essential salts of potassium, magnesium, calcium, phosphorus and sulphur can be used to grow hardy orchids. These include Malmgren's medium, quarter strength Murashige and Skoog medium, half or full strength Phytamax® and TGZ-SL/N®. A general rule that seems to apply to most European orchids, at least, is that the basal salt concentration of the medium must be comparatively dilute when compared with media more appropriate for tropical species. Furthermore, many of these European species (and probably the majority of hardy orchid species in general) appreciate the inclusion of various B-vitamins, particularly thiamine (vitamin B1) and the incorporation of nitrogen either wholly or in part in organic form, for example amino acids, polypeptides, peptone or casein hydrolysate. My current favourite is a modified Malmgren's medium which is available in a dry ready-to-use form from the HOS to its members.

**Malmgren's medium** (modified according to JH):

75mg/l each of  $\text{KH}_2\text{PO}_4$ ,  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$  and  $\text{Ca}_3(\text{PO}_4)_2$

Organic nitrogen source : 300mg/l casein hydrolysate plus 100mg/l peptone

Vitamin B complex

Sucrose 8-10 g/l for germination, 12-15 g/l for growing on

0.5-1 g/l activated charcoal

5-6 g/l agar

pH 5.7 - 5.9

Equally successful in many cases are Phytamax® and the easily available but expensive TGZ-SL/N® which can often be obtained from orchid sundries suppliers. It is unlikely that amateurs would be able to source Phytamax directly from the manufacturer, Sigma-Aldrich, other than via the business address of a scientific, medical or research institution. TGZ-SL® is designed for germinating seed and TGZ-N® for growing on. If using Phytamax® my own preference is to sow seed on 25% (but more sucrose needs to be added to restore the concentration to 10g/litre). If the P0931 blend of Phytamax® is used agar must, of course, be added and activated or



vegetable charcoal as well. P6668 already contains added charcoal. The seed of European orchids will often germinate best on media with a sucrose content of 10g/litre or less. For transplanting and growing on, a higher strength Phytamax® is tolerated well (I would recommend 50% in most cases) and an increase in the sucrose concentration to 12 to 15g/litre is beneficial. Always remember the pH adjustment unless you are using distilled water and a ready-buffered complete medium without additives of your own. I always add complex organics as described above when using Phytamax®. TGZ-SL® is a medium designed to be used unadulterated and the manufacturers recommend their own complex additives for TGZ-N®. Pre-packaged ready-weighed media remove the need for an accurate balance but will require you to make up at least a litre of medium at a time.

The great benefit obtained from adding complex organics to your medium unfortunately means that pH adjustment is obligatory even if the medium is otherwise complete and supposedly buffered to the correct pH. Pineapple juice, in particular, is highly acidic and will require restoration of the correct pH by adding alkali. The best chemical for this purpose is undoubtedly potassium hydroxide but good results can also be obtained by adjusting the pH upwards with household ammonia added a drop at a time. This is likely to be much more available to amateurs. A drop or two of caustic soda (sodium hydroxide) can be used for minor upward pH adjustments but is best avoided – many northern hemisphere terrestrial orchid seedlings do not like sodium ions being added to their asymbiotic media in any great quantity.

Hand-held pH meters are cheap, easy to obtain and provide an accuracy that pH paper cannot match. My experience has been with meters designed to adjust the pH of the water used in aquaria. They can easily be obtained from pet sundry suppliers or via Internet sources. pH meters cannot be used in very hot liquids, so unless you intend to add your solid organic complex additives at the last minute as small pieces, it is best to microwave the vegetables first in a small quantity of water in order to soften them, blend them (a hand-held kitchen blender is ideal) and then add the rest of the medium ingredients and top-up with cold water before adjusting the pH. Subsequently microwave the medium to boiling point to melt the agar.

Deliver your hot medium with care into appropriate vessels (I generally use open-topped Kilner or honey jars) and autoclave to sterilise them by cooking for 20 minutes on high in a domestic pressure cooker. Alternatively, the medium can be autoclaved and distributed into Petri dishes which can be purchased ready-sterilised in packs of 20 or 25. The Internet and web-based outlets such as E-Bay® have made it very much easier for the amateur to obtain laboratory supplies like Petri dishes, chemicals, accurate balances and other equipment than was formerly the case.

Although mains water can and has been used to prepare media, much of the British

supply contains comparatively high levels of minerals, not necessarily a bad thing *per se*, but which may impart a high pH of 7 to 7.5 to the medium. Using such a water source in your medium will necessarily require extensive pH adjustment which may well introduce an excess of potentially undesirable ions such as sodium or chloride to the medium (depending on which acids and alkalis the amateur can access for pH adjustment). Rain water collected off glass and roughly filtered through kitchen towel is a good substitute for expensive purified or deionised supplies. Another substitute that I have regularly used is the water that collects in my basement dehumidifier.

### **Work spaces and materials**

Most amateurs commence their manipulations, whether they might be seed sowing or transplanting seedlings, in a home-made glove box or similar construction. I would refer the reader to early editions of the HOS newsletter for articles regarding these and their construction. Even home-made laminar-flow cabinets are fairly straightforward to make but sometimes real bargains can be found on Internet sites. I have purchased many nearly new laminar-flow cabinets for less than £200 a piece. A problem with these, however, is their size and you really need a dedicated spare room or garage in which to house one. Older designs which may be smaller can sometimes be obtained second-hand and are often a very good buy if they have been well maintained.

Before beginning your manipulations it is important to clean the inside of your glove-box or cabinet with a sterilant solution. 100% ethanol may be an excellent choice for those few with access to it, but most amateurs will only be able to obtain methylated spirit. The toxicity of the methanol in the vapour of methylated spirit makes it less of a good choice and my own preference is to use 5% bleach, preferably a brand like Domestos®, which contains cleansing surfactants in addition to the bleaching agent, hypochlorite. Although care must be taken when using bleach solutions as they, too, are toxic and also corrosive, on balance I feel that wearing rubber gloves and using 5% bleach is the better choice for the amateur. Many designs of home-made glove-box and some of the smaller, more dated designs of laminar-flow cabinet, moreover, are constructed using clear Perspex® or rigid plastic panels. Such components are rapidly degraded by alcohols, whether they be methylated or not, making diluted bleach a preferable sterilant for such surfaces. Everything that enters your cabinet/glove-box that is not straight from the pressure cooker or otherwise pre-sterilised (including your gloved hands) should be doused in the sterilant beforehand. The best gloves to wear are undoubtedly snug-fitting surgical gloves ...again I would refer the amateur to Internet sources to obtain these. Examination or kitchen gloves are less suitable, more cumbersome alternatives.

### **Seed sowing**

The orchid seed obviously has to be chemically sterilised and preferably rinsed too, whether symbiotic or asymbiotic techniques are being used. Rinsing may be of less importance when using asymbiotic media as long as medium pH is not affected, but bleach solutions may well adversely affect fungal growth if symbiotic methods are being used.

In addition to the seed sowing methods described in the literature, one very easy way of sterilising seed is to use a sowing tube designed for the purpose. One such design has been developed by Bill Temple and is available from the HOS. These tubes are simple clear plastic tubes open at one end and with a fine mesh filter at the other to retain the seed. Both ends may be plugged with flexible rubber end caps. The seed is introduced with the capped mesh-end at the bottom and 5 or 10% bleach then added (Domestos® is a predictably consistent product to use). By then capping the open end, the tube can be gently rocked or rolled, all the time observing the degree of bleaching through the clear plastic. Once the seed reaches the required degree of bleaching (a not too pale honey colour usually indicates adequacy in most cases), the tube is dipped in sterilant before being introduced into your clean working area with gloved hands and held over a sterilised vessel to catch the washings. Remove the bottom cap covering the mesh, then the top cap and the bleach will pour through the mesh leaving the sterilised seed upon it. Seed washing can be achieved by repeating the process with small amounts of sterilised water (it makes no difference if this is tap or purified water but it must be pressure-cooked and cooled). Sterile needle-less syringes (Internet sources or the local pharmacy) provide a good way of introducing the washes into the tube, either by flushing straight through or by re-attaching the caps, rinsing and re-draining. The seed can then be sown either by re-suspending in a little sterile water and pouring or by daubing the seed from the tube onto the medium using a sterile spatula, taking care not to damage the mesh.

### **Symbiotic propagation**

I would recommend that first-time growers attempt symbiotic propagation initially. Several proven symbiotic fungi are obtainable via the HOS together with compatible seed if you do not have your own. Because of the relatively rapid rate of germination and subsequent growth using the symbiotic method, I find it easier to sow on Petri dishes of Basic Oats medium rather than in flasks. The medium is very easily prepared using food-grade porridge oats powdered in a food processor and then passed through a flour sieve to remove the coarser particles. Purified or filtered rain water with a slightly acid pH is preferable in most cases but there is no need to measure or adjust the pH. A very few fungi, particularly those isolated from *Ophrys* species, seem to grow much better on media made with the more calcium-rich alkaline water that comes out of many British taps.

Laboratory-grade dried yeast extract may be difficult for the amateur to obtain in

which case a commercial food yeast extract such as Marmite® or Vegemite® will suffice. Because the amount of yeast extract in Oats medium is so small (0.1g/litre), the low concentration of salt in media prepared with these edible forms of yeast extract does not appear to be high enough to adversely affect the growth of either fungi or protocorms.

If at all possible, try to obtain and use laboratory-grade plant agar. Food-grade agar can be used but different batches and brands set unpredictably, there may be undesirable extraneous materials and a fair degree of experimentation is necessary in order to work out the appropriate concentration to use to achieve a suitably firm gel. Having said all this, it usually does work. I like my media to be comparatively soft so that roots can penetrate and I rarely exceed 5g/l of laboratory-grade plant agar in any of my media.

Major advantages to the non-professional of using the symbiotic technique include not only its simplicity but also that minor contamination caused by inexperienced hands and amateur equipment will not always cause the cultures to be lost. Seed sown on Basic Oats medium with a compatible fungus will normally germinate within a month or two and the protocorms should be transferred to fresh medium at a low density as soon as it is practicable to pick them up off the sowing plate. Sterile plastic forceps designed for medical dressing kits are cheap and ideal for this purpose and most brands can withstand being re-sterilised in the pressure cooker many times.

It is possible to reach a suitable stage of growth to de-flask / de-plate with only a single transplantation from the sowing plate – obviously another benefit to the amateur grower. It is crucial, however, to perform your sowings at the correct time of year in order to achieve this. Summer-green species such as *Dactylorhiza*, *Gymnadenia* and *Platanthera* need to be sown in the late summer or autumn (the time of normal seed production) and the symbiotic protocorms transferred to fresh Oats medium on 9cm Petri dishes at a density of no more than about 5 to 7 protocorms per dish. After a further month at room temperature the protocorms fatten up and often start to develop an obvious shoot initial. At this stage the sealed plates (commercial cling-film works just as well as a plate sealer as expensive laboratory sealing film) must be refrigerated for about 3 months over the winter in order to vernalise the protocorms. In the spring, the now quite substantial protocorms can be planted out directly into soil or compost and they will grow away just like planting out peas (Dash 1999).

The seed of winter-green species (e.g. *Anacamptis* and *Serapias*) should be sown symbiotically in the late summer or early autumn (the time the first substantial rainfall of the year arrives in the Mediterranean) and transferred to fresh Oats medium in jars as soon as the protocorms are large enough. Honey jars with translucent auto-

clavable plastic screw-caps are best and are available from orchid sundries suppliers). The reason for using jars as opposed to dishes is that shoots appear very rapidly and gain substantial height whilst the seedlings are still *in vitro*. Once the shoots begin to form the plants can be grown on in a cool, light place such as a north-facing windowsill in an unheated room or under fluorescent lights under the bench in the greenhouse. Once green leaves are present and roots 1cm or so in length have formed in the medium, the little plants are ready to de-flask and transfer to compost. This is usually about November/December. Potted up in clay pots and kept in a shady, damp sand plunge in an unheated but frost-free greenhouse, the seedlings will continue to grow over the winter and form small first-year tubers in the late spring. It is a good idea to cloche the freshly weaned seedlings to prevent dehydration and to allow them to become accustomed to an *ex vitro* existence. Individual 11cm clay pots are easily cloched using cut-in-half PTFE 2 litre water bottles; leave them capped for 7 days, then remove the caps and de-cloche altogether in another week. Whether sowing winter-greens or summer-greens the timing of the sowing (and the refrigeration requirement for the latter) are absolutely crucial and cannot be emphasised enough. Propagated seedlings cannot be deflasked at the wrong time of year and be expected to survive.

### **Fungal Isolation**

Fungal isolation can be done using relatively simple equipment. One very easy method described by Jim Hill in the HOS newsletter entails cleaning a short length of orchid root in soapy water, immersing it in bleach for a short time and then, after several rinses in sterile water, sectioning the root into small cylinders which are placed directly onto Oats medium in Petri dishes (Hill, 1999). This very simple technique, whilst not always successful, can make it possible even for inexperienced amateurs to isolate potentially symbiotic fungi from their own orchids and with a degree of luck obtain novel symbionts.

### **Maintaining fungi**

It has been recommended that fungal cultures be maintained on the dilute mineral medium used by Clements and Ellyard in Australia to isolate fungi from orchid roots (Clements and Ellyard, 1979), the so-called "Fungal Isolating Medium". In reality, many of the more frequently used fungi such as Jim Hill's "B1", Alan Dash's and Adrian Blundell's "A36" and Kew's "414" can be maintained perfectly well on the same Oats medium as is used to sow the seed and grow the seedlings. In addition, nearly all the useful fungi appear to retain their vigour and, more importantly, their ability to germinate orchid seed when maintained in the presence of orchid protocorms. This is best achieved on Oats medium.

### Asymbiotic propagation

As an amateur propagator, I have always found that the extended periods, often many months and sometimes several years, that are required to achieve germination on asymbiotic media makes sowing in jars a better method than sowing in Petri dishes. Medium in the latter has a tendency to dry out over time and cultures kept on dishes for extended periods appear to be more susceptible to infection. After sowing, there is a requirement to refrigerate summer-green orchid seed / protocorms / seedlings in order to stimulate germination and/or growth the following spring and even some of the more northern winter-green species such as *Orchis* spp and *Ophrys apifera* require a similar vernalisation in order to achieve germination in the spring. Some bee orchid seed even appears to require refrigeration for two consecutive winters before it will germinate during the second spring.

Because growth on asymbiotic media is often slow compared with the symbiotic method, the seed of those winter-green species that do not require refrigeration often needs to be sown a month or two earlier than it is naturally produced in the wild in order to achieve viable *in vitro* seedlings by the following winter and de-flaskable tubers by the early summer thereafter. In other words, sow seed collected the previous year. In any case, seed that has been correctly dried and stored in a refrigerator for a year or two will often germinate very much more predictably than will freshly collected material.

Summer-green seedlings grown asymbiotically are best weaned into compost in the spring following their second year of *in vitro* winter refrigeration. Winter-greens grown asymbiotically will not survive deflasking unless substantial tubers that permit survival over the summer dormancy period have already formed in the medium. Unfortunately these tubers often survive the summer poorly if left on agar and various strategies such as spring or summer weaning, for example, need to be adopted to preserve them successfully over the summer months.

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## Conservation - 2011 Update Bill Temple

The past year has seen the usual mix of orchid relocations (Bee orchids and White Helleborines), reports of orchids illegally dug from the wild and the provision of advice to various individuals and organisations. Man Orchid (*Orchis anthropophorum*) numbers crashed at one Essex Wildlife Trust reserve and I visited the reserve for a day and gave some advice. As a result of this visit it has been agreed (subject to seed availability) that HOS will start a conservation project to raise Man orchids from seed for them. As the Man Orchid is not a Schedule 8 species, seed pod numbers will not be restricted by a Schedule 8 licence. The intention is that, if I obtain enough seed pods, any HOS member who has successfully raised orchids from seed to flowering may help in this project. (As we have some members who have only started raising orchids from seed recently, I will accept volunteers who have had success in weaning seed raised plants onto soil-like media and raising orchids bought in small tubes to flowering). This project will be subject to the following rules – 80% of any plants raised are to be returned to Essex Wildlife Trust (via me) and the other 20% can be kept or sold by the raiser. If you meet the eligibility criteria above and you are interested in helping please let me know.

The Waitrose WildCare scheme continues and as HOS Conservation Officer I am involved in the orchid related aspects.

### More 2011 Photographic Show Winners

The following three pages feature further winning images. Photographs are identified by two linked numbers, the first indicates the class and the second the place achieved. With one exception these are from the second placed winners.

- 1-2: *Dactylorhiza fuchsii* by Tony Hughes
- 2-2: *Orchis anatolica* by Walter Kemp
- 3-2: *Orchis anatolica* by Walter Kemp
- 4-2: *Limodorum abortivum* by Walter Kemp
- 6-2: *Orchis purpurea* by Karen Gregory
- 7-2: *Spiranthes spiralis* by Gillian Elsom
- 8-2: *Ophrys minoa* by Tony Hughes
- 9-2: *Dactylorhiza maculata* by Patrick Marks
- 10-2: *Spiranthes spiralis* by Alan Pearson
- 11-2: *Epipactis atrorubens* by David Pearce
- 12-2: *Orchis tridentata* by Mike Lutener
- 13-1: *Ophrys scolopax* by Karen Gregory









9-2



12-2



4-2



6-2

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