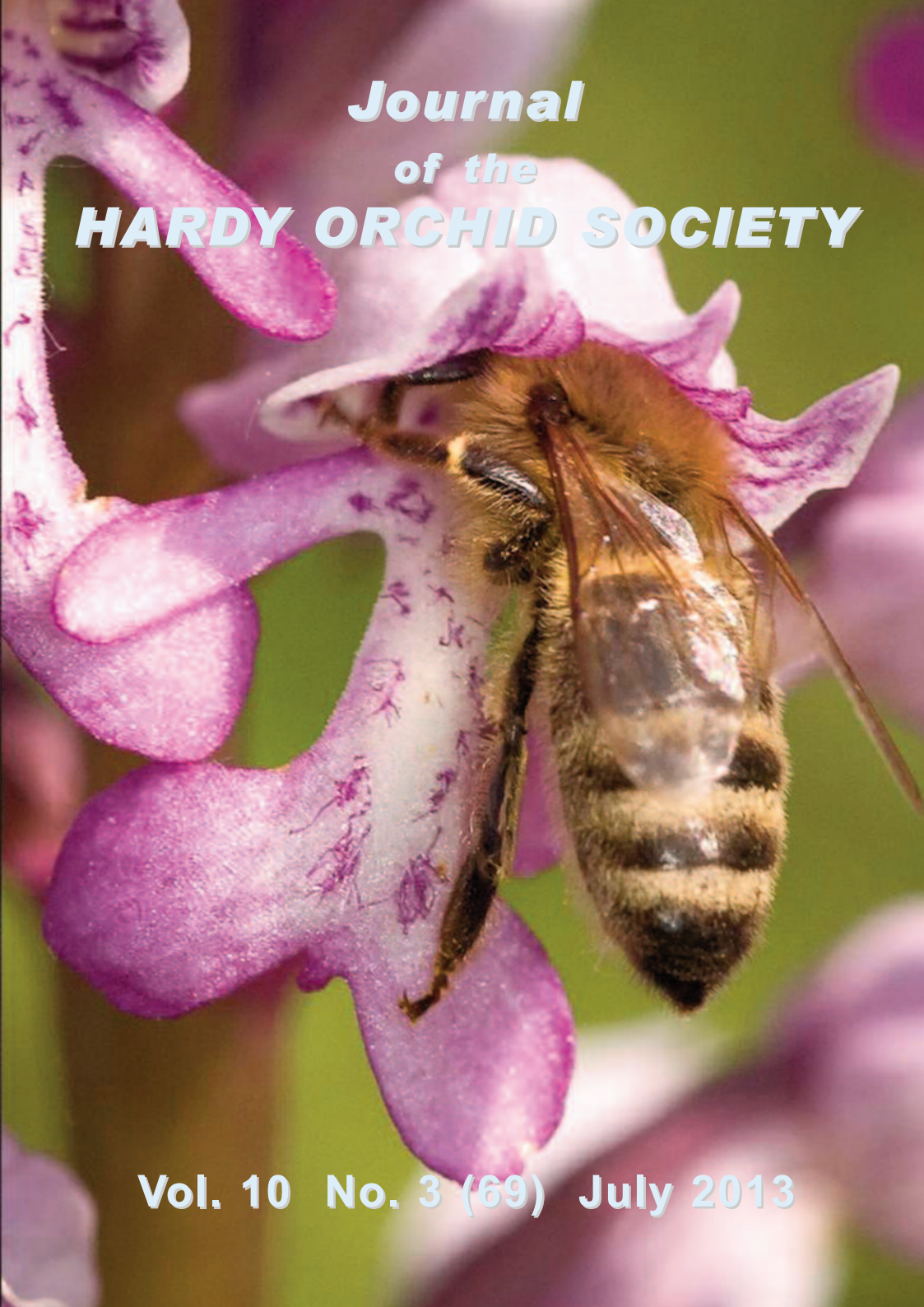

Journal of the HARDY ORCHID SOCIETY

Vol. 10 No. 3 (69) July 2013

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**, 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.

The Hardy Orchid Society Committee

Front Cover Photograph

A bumblebee (*Bombus terrestris*) pollinates *Dactylorhiza praetermissa*. Photograph taken by Jean Claessens and Jacques Kleynen at Bunde, The Netherlands on 16th June 2008. See article about pollination on page 83

Contents

Editorial Note

There is something of a mixed content in this issue of *JHOS*. I am especially pleased to be able to have the first of a series of articles on pollination from Jean Claessens and Jacques Kleynen. If you do not have their beautiful book and did not witness their recent talks at HOS meetings then here is a flavour of what you are missing. I have included an article on Australian orchid conservation. Although this is a long way removed from our local orchid scene, the perspectives on conservation and the engagement of local support are of considerable relevance.

I mentioned in the last *JHOS* the fact that we are not getting many concise articles submitted and that trend continues. This issue was only just filled with content, so please do think about contributing if you have interesting observations. One small addition this time is the inclusion of members' photographs and reference to personal websites. Including one or two sample panels with four images seems like a good way to fill vacant space and give some exposure to the many talented photographers within the society. Also, let me know if you have a website and want it mentioned in *JHOS*. If interested in having sample photographs included please send a few of your best shots and I will try to include some whenever I get available space.

Chairman's Note

Celia Wright

Greetings to you all. I hope you're all enjoying the summer that finally seems to have arrived. Our field trips are going well though some of the dates have been changed to account for the late season. I'm sure that many of you are out and about photographing orchids in the UK and Europe. We'd love to see your pictures and hear about finding the plants, so please consider talking about your trip at an HOS meeting. What about a 5 or 10 minute short presentation, maybe on just one species or a special location? I've left spaces in both the Leeds (Saturday 7th September) and Autumn Kidlington (Sunday 17th November) programmes for offers of short talks, so please contact me with offers to fill these slots – phone 01743 884576 or email celia.wright@tiscali.co.uk.

You can also enter your photographs for the HOS photographic competition. As I wrote in the April Journal, some of the Rules have changed and were printed in that issue. Look on page 94 for an example of an artistic image entitled Rock-a-bye Baby by Jon Evans. The closing dates for entries this year are now confirmed as October 14th for digital entries and November 4th for notifications of print entries and postal entries of prints.

Also in this Issue, you will find an article from John Wallington, our Treasurer, on the finances of the society and the need for an increase in members' subscription rates. We will take this to an Extraordinary General Meeting at the Leeds meeting where it will be the only item on the agenda so that we can implement the rise from May 2014. We considered this matter at length in committee. The last time HOS increased its subscriptions was in May 2004. The committee has taken the view since then that any rises are unwelcome to the membership and small rises are a great deal of work for the Membership Secretary and Treasurer with little long term benefit to the society. So we've held on for 10 years and are now planning a sufficiently substantial increase to last us, we hope, for several years. The major driver has been the increase in postal rates. The cost of a second class stamp in the UK has risen from 21p in 2004 to 50p today and is forecast to continue to rise. The cost of postage to Europe and the rest of the world is considerably more and has risen even faster. So please forgive us for doing this and reflect on how much you get from your membership at a cost that is still considerably less than that of other organisations.

I end with a plea for help. One of our members, Nick Gilliam, is hoping to set up a National Collection of Bletillas. Nick has been given many of the plants held by the previous Collection holder, Richard Evenden, but is aware that some of the hybrids bred by Richard (often including the word Penway in their name) may have been sold at an earlier date and not have come to him. If any member has one of Richard's hybrids, will they please make contact with Nick at nickgilliam@hotmail.com.

Proposed Increase in the HOS Subscription

John Wallington

At the AGM I said that the financial situation was slightly worse than that of the previous year and that although the situation was not urgent some steps needed to be taken. Since then I have undertaken a rigorous analysis of the Society's finances over the period 2006/7 to 2012/3. I have tried to identify trends in expenses and income over the years and have then tried to project these trends into the future. The result is that we need to significantly increase our income or decrease our expenditure. The only realistic way to achieve the necessary reversal of the downward financial trend is to increase the membership subscription.

The need for the increase was agreed unanimously at the Committee Meeting held on 12th May 2013. To change the subscription rate requires the agreement of a General Meeting of the Society and so an EGM will be called for the meeting to be held in Leeds on September 7th 2013. A proposal to increase the subscriptions for the year 2014/5 will be put to this meeting and, if it is agreed, the work will then begin to inform all of our members and put in place the changes. The proposal will be to increase subscriptions as indicated in the table below. A significant increase is being proposed as considerable effort and cost is involved in implementing a change and none of us wish this to become a regular occurrence. The increase proposed should be sufficient to stabilise the financial situation for the next 4 or 5 years (although nothing can be guaranteed in the current economic climate).

It is the belief of all of the Committee members that membership of the Hardy Orchid Society remains very good value for money even after the proposed increase. And, let us consider, what else could be purchased for £5? Very little.

	Single	Family	Joining Fee
UK Residents	**£17**	**£20**	**£5**
European Residents	**£20**	**£23**	**£5**
	€25	**€30**	**€5**
Overseas Residents	**£25**	**£28**	**£5**
	$40	**$45**	**$10**

Plant Show 2013

David Hughes

I'd like to congratulate and thank all those who contributed to this year's Plant Show. I'd been warned by several growers that it was such a bad season they wouldn't be producing much, so I wondered if we needed all those tables. As it was we had a splendid display of excellent and interesting orchids so our judges, Brian and Jo Walker, were often tested in their choices. It is great to have Barry Tattersall's plants on the bench again and they all did well. Malcolm Brownsword produced a good selection and also put a number of plants in the non-competitive display. He deservedly won the Banksian medal. Congratulations too, to Richard Manuel who won the Best in Show Trophy with his perfect *Anacamptis longicornu*. The results follow:

Class 2: Three pots native European (not native to Britain) orchids, distinct varieties
1st Barry Tattersall: *Serapias neglecta* × *lingua* (Fig. 1a); *Serapias orientalis*; *Ophrys speculum* (Fig. 1c)
2nd Mike Powell: *Ophrys sicula*; *Ophrys heidreichii*; *Ophrys fuciflora* × *tenthredinifera*

Class 3: Three pots non-European hardy orchids, distinct varieties
1st Maren Talbot: *Pleione* Salek "Eagle Owl"; *Pleione yunnanensis* (Fig. 3); *Pleione* Achievement
2nd Malcolm Brownsword: *Pleione* formosana "Snowcap"; *Pleione* krakatowa "Wheatear"; *Pleione* Massaya

Class 4: Three pots hardy orchids, distinct varieties, any country of origin
1st Barry Tattersall: *Orchis ichnusae*; *Ophrys reinholdii* (Fig. 4b); *Serapias neglecta* × *Anacamptis morio* (Fig. 4c)

Class 5: One pot native British orchid
1st Neil Hubbard: *Anacamptis morio*
2nd Barry Tattersall: *Anacamptis laxiflora*
3rd Neil Evans: *Orchis mascula*

Class 6: One pot native European (not native to Britain) orchid
1st Richard Manuel: *Anacamptis longicornu* (Fig. 6) ***Best in ShowTrophy***

Class 7: One pot native European (not native to Britain) orchid
1st Barry Tattersall: *Diuris orientis* (Fig. 7)
2nd Malcolm Brownsword: *Calanthe aristulifera*

Class 9: One pot *Orchis*, *Anacamptis* or *Neotinea*
1st Barry Tattersall: *Orchis italica*
2nd Neil Evans: *Orchis italica*
3rd Neil Evans: *Anacamptis morio* ssp. *longicornu*

Class 10: One pot Ophrys
1st Barry Tattersall: *Ophrys bertolonii*

Class 11: One pot Serapias
1st Barry Tattersall: *Serapias* ×*godferyi*

Class 12: One pot Cypripedium
1st Jeff Hutchings: *Cypripedium henryi*×*segawai*
2nd Malcolm Brownsword: *Cypripedium formosanum*
3rd Jeff Hutchings: *Cypripedium*

Class 13: One pot Calanthe
1st Malcolm Brownsword: *Calanthe graciliflora* Hayata

Class 14: One pot Pleione
1st Malcolm Brownsword: *Pleione* Spot Nosed Monkey (Fig. 14)
2nd Nigel Denman: *Pleione formosana* 'Clare'
3rd Nigel Denman: *Pleione* Fuego

[There were no entries in Classes 1 and 8]

Winner of Best in Show Trophy - Richard Manuel

Winner of RHS Banksian Medal - Malcolm Brownsword

[N.B. Barry Tattersall had most points (24) but won the medal last year; the RHS rules preclude winning it again this year, hence the medal was awarded to Malcolm Brownsword (14 points)]

Thanks to Brian Walker for judging the Plant Show

The following pages feature some of the first placed winners in the 2013 Plant Show. A complete set of photographs of the first placed winning plants is displayed on the HOS website. Numbers refer to the Class and where multiple plants are involved they are differentiated by a letter (a-c) that matches their order in the results list above.

Photos by Mike Gasson


1c


1a


4c


4b


6


7


3


14

The pollination of European orchids
Part 1: Introduction and the genera *Orchis* and *Dactylorhiza*

Jean Claessens and Jacques Kleynen

Introduction

Wild orchids inspire many people and incite them to undertake long journeys to find and photograph those beauties of nature. Far less people travel to find and study the pollinators, which is quite understandable as it inevitably takes much time and the chance of finding nothing at all is quite large. Unfortunately there are no GPS data available for sites where you are certain to find a specific pollinating insect. Yet the study of pollination is a very interesting and fulfilling subject, a new dimension that can help to understand why a certain orchid has a certain appearance and habitat

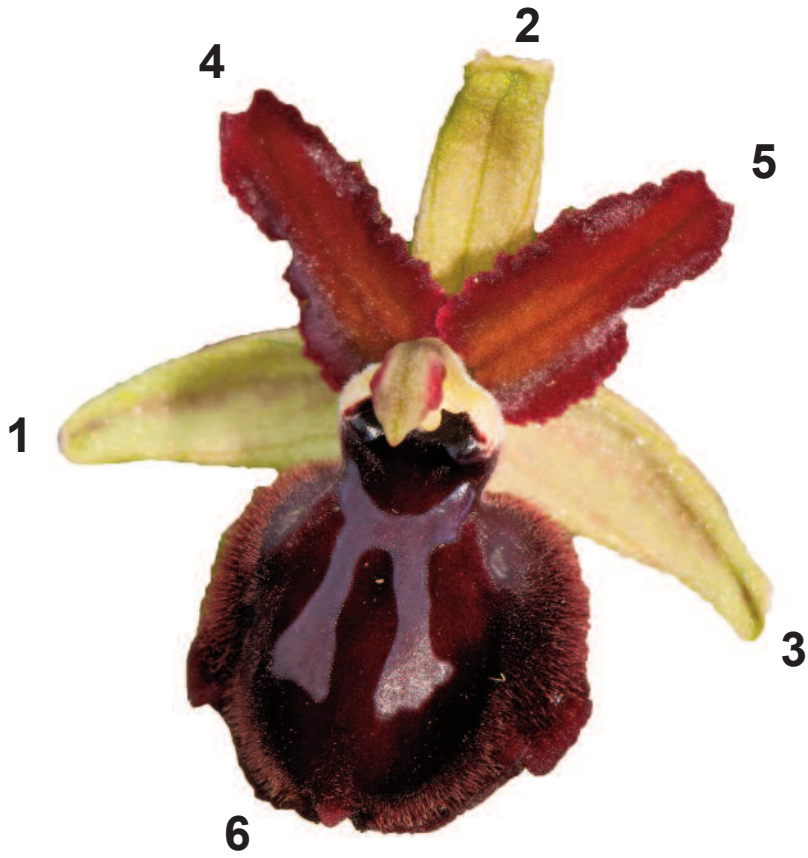

Fig. 1: Flower of *Ophrys garganica*. Numbers 1, 2 and 3 are the sepals, numbers 4 and 5 are the petals and number 6 is the lip.
Photos by Jean Claessens and Jacques Kleynen


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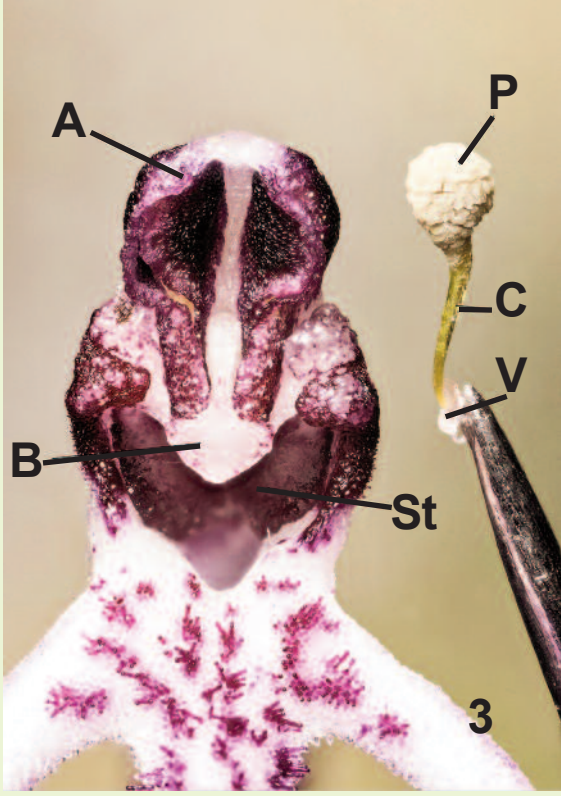
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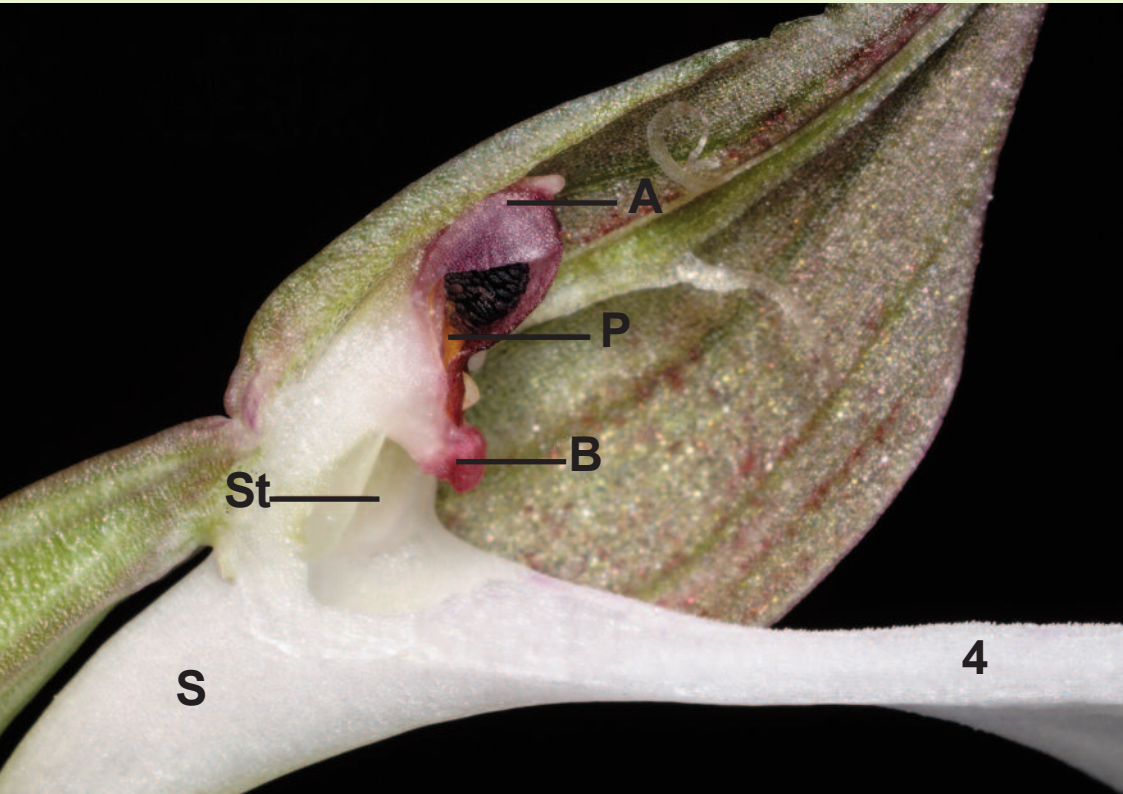
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demands. In this series of articles we will try to clarify those relationships. Each article will treat a certain genus and the adaptations of the orchid flower to meet the requirements of the pollinator.

Terminology

In this first article we will explain and illustrate the terms used. The flower morphology shows a general pattern, but we will see that there are many modifications of this ground pattern. Always, an orchid flower has two whorls of flower parts. The outer whorl has three sepals (Figure 1, labelled 1, 2 & 3), which generally are about equal in form and colour. The sepals on the left and right are called lateral sepals, while the one in the middle is the median sepal. Also, the inner whorl consists of three flower parts: two identical, generally short petals (Figure 1, labelled 4 and 5) and a third petal that has changed into the most conspicuous part of the orchid flower, the lip (Figure 1, labelled 6). In most orchid genera the lip points downwards. When an orchid flower is in bud the lip points upwards, but due to the twisting of the flower pedicel or the bending over of the flower, the lip becomes the lower part. In this position it can function as a suitable landing place for visiting insects.

Inside the flower is the column (Figures 3 and 4), a special organ that arose from the fusion of stamen and stigma. In general in the European orchids there is only one stamen left from the three stamens of the primitive orchids. The stamen is bipartite and is stored in an equally bipartite anther. The pollen grains can be single (monad), in packages of four (tetrad) or in much larger packages (massulae). They are held together by a very sticky fluid, the elastoviscin, and form a pollen package, called the pollinium. A pollinium can have a round or filiform, yellow elongation, the caudicle. The caudicle in turn is connected to a viscid disc, the viscidium. The combination of pollinium, caudicle and viscidium is called a pollinarium (Figure 2). The viscidium is not necessarily disc-like; we will see that it can have different shapes. Its function however is the same: fixing the pollinium or pollinarium to a visiting insect. In some orchids the viscidium (or if there are two, the viscidia) is protected by a pouch-like membrane, the bursicle.

Fig. 2: Pollinarium of *Ophrys scolopax*, sticking to a sepal.
Fig. 3: Column and pollinarium of *Orchis purpurea*. A=anther, B=bursicle containing the viscidia, St=stigma, P=pollinium, C=caudicle, V=viscidium (viscid disc).
Fig. 4: Longitudinal section of a flower of *Himantoglossum comperianum*. A=anther, P=pollinarium partly visible inside the anther, B= protruding bursicle, St=stigma, S=spur, O=ovary.

Photos by Jean Claessens and Jacques Kleynen

The lower part of the column is the stigma, which generally is situated below the anther and the viscidium. It often lies in a stigmatic cavity and is covered with glistening stigmatic fluid which is capable of retaining pollen fragments. The lip may have a short or long, tube-like extension, the spur, which may contain nectar. The spur entrance generally is under the stigma. The column is connected to the ovary, which contains a large number of ovules.

Orchis* and *Dactylorhiza

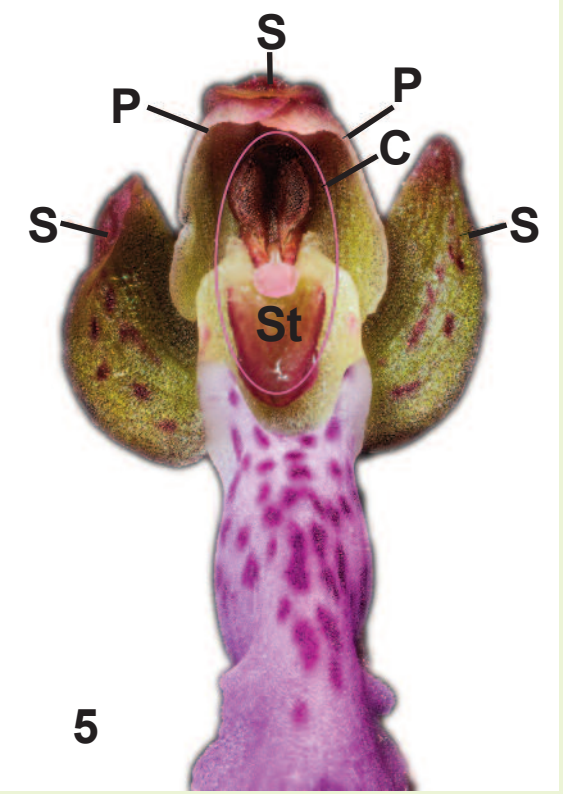
The principle of pollination is often illustrated by referring to Charles Darwin's ground breaking book "*The Various Contrivances by which Orchids are Fertilized by Insects*", published in 1877. Darwin used drawings of *Orchis mascula* to illustrate the pollination process.

In *Orchis* and *Dactylorhiza* the flower and column structure are quite similar (figure 5 and 6). Both genera have flowers that are readily accessible for insects. Sepals and petals form a loose helmet and the lip is bent downwards, providing a good landing place for insects. The insect is lured to visit the flowers by means of scent, the stimulus for approaching the flowers. The lip is the organ used to attract insects from nearby, and often it has a distinct pattern of dots and lines, the so-called honey guides. They lead towards the spur entrance in the centre of the flower. The spur can be bent downwards or upwards and contains no nectar. *Orchis* and *Dactylorhiza* are called deceit flowers because they offer their visitors no nectar reward. The lip surface is covered with fine papillae, giving the insect visitors a good hold.

When approaching the spur entrance, the insect visitor meets the column. In *Orchis* and *Dactylorhiza* the anther is upright and extends in a bursicle containing two viscid discs. Underneath lies a stigmatic cavity created by the opening of the spur. The large, more or less rectangular to triangular stigma is situated at the "ceiling" of the spur, right above the spur entrance. In order to reach the supposed nectar the insect has to bend forward. In doing so, there is a great chance that it will touch the protective bursicle. This is pushed backwards, thus freeing the viscidia which are glued to

Fig. 5: Flower of *Orchis spitzelii*. S=sepal, P=petal, C=column, St=stigma
Fig. 6: Column of *Orchis mascula*, sideview. The bursicle is pushed backwards, freeing the two viscidia. The pollinarium sticks to a needle and has bent forward. It can now reach the stigmatic surface behind the bursicle.
Fig. 7: The bumblebee (*Bombus terrestris*) in vain tries to remove the extremely flexible pollinia of *D. praetermissa*.
Fig. 8: A bumblebee (*Bombus pascuorum*) pollinates *Orchis mascula*. It has 8 pollinaria attached to its head. Valkenburg (The Netherlands), 3rd May 2012

Photos by Jean Claessens and Jacques Kleynen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the insect's head when it touches them. The glue covering the viscidia instantly hardens and then it is no longer possible for an insect to remove the pollinarium. This obviously bothers the insects, for we observed many times how they tried to get rid of the pollinaria by grooming intensely. But the caudicles are very flexible and can be stretched up to ten times their length without breaking (Figure 7). The pollen fragments are held together by the elastoviscin threads. Generally, it is impossible for the insects to remove the pollinaria. After grooming they go on to visit the next flower of the same plant or they move towards another orchid plant.

When the pollinaria are withdrawn, they stand upright on the insect's head, just like their position within the anther. But in order to reach the stigma, they have to bend forward by about 90 degrees. This is accomplished by the dehydration of the base of the caudicle, which makes the caudicle base contract, causing the bending movement. Darwin placed a forward bent caudicle in water and observed how it went back to its original position (Darwin 1877, page 191). This is a quite interesting experiment which you can carry out yourself easily. Just put a pin into the flower, collect one pollinarium and observe how it bends forward within 20 to 50 seconds (Claessens & Kleynen 2011). Then place it into some water and see the opposite movement. This little experiment gives you better understanding of the bending mechanism of the caudicle.

Fig. 9: A honeybee (*Apis mellifera*) pollinating *Dactylorhiza sphagnicola*
Brunssum (The Netherlands), 8th June 2010
Photos by Jean Claessens and Jacques Kleynen

When visiting another flower the pollinium is in the right position to touch the stigma. The stigmatic fluid has an even larger viscid force than the viscidium or the elastoviscin strands, for when the pollinium is pushed against the stigma it retains fragments of the entire pollinium. The rest of the pollinium stays on the insect's head ready for pollination of other orchid flowers.

References

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Darwin, C. (1877) *The Various Contrivances By Which Orchids Are Fertilized By Insects.* John Murray, London

Nilsson, L. A. (1983) Anthecology of *Orchis mascula* (Orchidaceae). *Nordic Journal of Botany* 3 (2): 157-159.

Yet Another Article on Bee Orchid Variants

Stan Jordan

Over the past year there has been a spate of articles on the Bee orchid (*Ophrys apifera*). Now here is another one, but this one is about the ability of *Ophrys apifera* to vary from one year to the next. It is now well known that a normal Bee orchid can change over the winter period and appear the following year as a variant. This is fairly frequent on the limestone outcrops of the Cotswolds, particularly between a normal Bee orchid and an *Ophrys apifera* var. *belgarum* or even a *trollii* variant. The variant that has eluded me for years is the "brown bee" or *atrofucsca*/*fulvofusca* type. A couple of years ago an *atrofusca* variant appeared in Weymouth. My wife and I went down to see Lorne and Sheila Edwards, who showed us the plants. While we were looking at the plants my eye wandered over the vegetation in the area around the plants, especially the small bushes. The reason for this is some plants do have an effect on the symbiotic fungus that feeds the orchid. There was no plant that immediately stood out regarding this aspect.

Many years ago I wrote an article on a pseudanthial Common Spotted-orchid, (*Dactylorhiza fuchsii*) that appeared close to where I live (Jordan, 2008). In that article I mentioned the arrival at that site of four flowering Bee orchids and many non flowering plants. The following information refers to *Ophrys apifera* at that site. As this site is the closest to where I live, I visit it quite frequently during the orchid flowering season. The Bee Orchids vary in number and the most that have flowered was fourteen, but most years there are eight or nine. One particular plant has always stood out from the rest, because of its very dark colouring, so every year when I go there I always photograph this particular plant. I have even put metal markers in the ground to mark where it was. I have now progressed to making a map/plan of the

Fig. 1: Mutant Bee Orchid (*Ophrys apifera*)
Photo by Stan Jordan

area, marking the flowering plants, and taking GPS readings of all of the plants. This may seem excessive, but it has produced some interesting results. The last four photographs of this same plant show slight differences, mainly in the necklace on the labellum. This year's photograph shows a plant with a plain, dark brown labellum with no markings at all. So it could be described as an *atrofusca*/*vulvofusca* variant.

The site has had orchids on it since 1971. It was used as a landfill site with soil left over from the building of the M5 motorway. The soil there was brought in from all over the Midlands for the raised sections of the motorway. So there is probably soil of many different types on the site. This year (2012), I noticed one of the other plants had got significantly darker in colour, also a mutant variant appeared (Figure 1), something I have not seen at this site before. I am just wondering what it will be like next year, if it appears! Four photographs (Figures 2-5) show the same dark coloured plant, over four different years − 2007, 2008, 2011 and 2012 (this particular plant did not flower in 2009 and 2010). There were two very severe winters in 2008/2009 and 2009/2010 that may have contributed to the reason why the plants did not flower in those years. Also, 2008 was the last year that the pseudanthial Common Spotted-orchid (*Dactylorhiza fuchsii*) flowered. None of the seven plants has re-appeared, so presumably they have gone forever. This article was written to show how much variation there is in any given plant species over the years.

Reference

Jordan, S. (2008) An unusual floral mutant of the Common Spotted-orchid. *JHOS* 5(1): 26-27.

Figs. 2-5: Four photographs of the same dark coloured Bee Orchid (*Ophrys apifera*) taken in separate years:
2007 (Fig. 3), 2008 (Fig. 2), 2011 (Fig. 5) and 2012 (Fig. 4).

Photos by Stan Jordan


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Book Review: *Eesti Orhideed*

Simon Tarrant

Eesti Orhideed [Estonian Orchids], by Tarmo Pikner; Varrak 2013; ISBN 978-9985-2621-3; 261pp; approx €17 plus postage. Obtainable from www.varrak.ee

This is a major new guide to the orchids of Estonia and the first to be published since the mid 1990s. The text is in Estonian, which will be more or less impenetrable to most western readers, but anyone with a serious interest in the native orchids of northern Europe and their distribution will want to study this work. So, what can the English reader gain from this book? There is no detailed site information, but Estonia divides conveniently into three regions, these being the islands of Saaremaa and Hiiumaa and the mainland, and the author includes a table indicating relative frequencies of occurrence in each of the three regions (with an English key) and another to show the range of flowering seasons for orchids in Estonia. In addition, the author has provided a one page insert in English in which he explains that he follows what we consider to be the 'old' nomenclature, because this is still in official use in Estonia (so, for example *Orchis morio* rather than *Anacamptis*). The insert also includes translations of some key words that are used as sub-headings in the species descriptions, such as stem, inflorescence and lip.

The bulk of the book is a species by species account of the 36 species currently recognised in Estonia. This follows a logical sequence from *Cypripedium* through the helleborines and concluding with *Corallorhiza*. For each species the text includes descriptions of leaves, stem, inflorescence etcetera, with relevant dimensions, following the same format for each species, so it is not too difficult to compare (for example) lip sizes of different *Dactylorhizas*. As well as the Estonian common name and the scientific name, common names in English, German, Finnish and Swedish are given for every species.

The great beauty of the descriptions is the range of photographs (all taken by the author). These include habitat, whole plant, flower spike and individual flowers. For plants that exhibit a variety of colours or markings, additional photographs are used - my eye was caught by the *alba* form of *Cephalanthera longifolia*, lacking any yellow on the flower lips. The book concludes with a section describing orchids that have disappeared from the Estonian list, such as *Dactylorhiza sambucina*, again with descriptions and photographs.

The book is the first volume in a new series: '*Roheline Eesti*' [Green Estonia]; future titles will include butterflies, birds and their nests, and swamps and bogs. Estonia is a beautiful country, large parts of which are unspoilt by the industrialisation of agriculture that we are familiar with in western Europe, and I feel that this book is a celebration of Estonian pride in their native orchids. The book is attractively presented, one rather special feature being the Contents Page, which gives a thumbnail photo beside the Estonian name for each species. I do need to mention that the printing process has rendered some of the violets and purples a shade too rich, but it has to be recognised that this is a thorny issue for a commercial publisher trying to present an affordable work.

Tarmo Pikner is a respected authority on Estonian orchids, and many HOS members will have seen his recent *JHOS* article (Pikner 2012), which presented a detailed study of Estonian dactylorhizas in English; the present work adds many more illustrations and help with identification. For anyone planning a visit to Estonia, I would recommend both works as essential travelling companions. I can't help feeling that if I had this book with me when I visited Saaremaa a couple of years ago, I would have felt a lot more confident about identifying the marsh orchids that I encountered.

References

Pikner,T. (2012) Taxonomic Diversity of *Dactylorhiza* on Saaremaa. *JHOS* 9(66):128-143

New Creative Image Class for the Photographic Show

Celia Wright

A new artistic Class 14 for the forthcoming Photographic Show was announced in the last *JHOS*: "A hardy orchid subject that has been manipulated creatively using any advanced software technique to create an artistic image. Print maximum size A4." This was inspired by the photograph on the following page (view sideways!), designed by Jon Evans and entitled "Rock-a-Bye-Baby". Jon takes excellent photographs of many of the prize winning plants at Alpine Garden Society shows, but as well as these realistic images, he likes to "play" with images on his computer. He starts with an idea of the image he would like to create and uses different digital techniques and filters to achieve his aim. For this image, he saw the Cypripedium flowers not as little slippers but as aerial cradles. Images of young relatives were cut out from other photographs and pasted into the flowers. I find this delightful and hope you do too. You can find examples of prize winning creative images in the AGS photographic competition, together with details on how they have been produced, on the AGS website. Go to www.alpinegardensociety.net/competitions/Photographic-Competition/ and follow the links to each year's Class 5 results.

Orchid Conservation Initiatives in Western Australia: The Adopt an Orchid Project (ADORP)

Jeremy Storey, Andrew Brown, George Tiong and Jim Cootes

With an estimated 7000 vascular plant species, the south-western region of the state of Western Australia has one of the most diverse botanical populations in the world and is recognised as a global biodiversity hotspot. This corner of the Australian continent covers some 350,000 square kilometres and consists of a coastal plain 20-120 kilometres wide, which transitions to gently undulating uplands, and geologically is made up of weathered granite, gneiss and laterite. The climate here is typical Mediterranean, which is characterised by heavy winter rains and dry summers, and the original vegetation is predominantly eucalyptus woodland, mallee scrubland and heath. In addition to having almost a third of the flora found in the entire Australian continent, nearly 70 percent of these plants are endemic to this region. Native plants, including orchids, have evolved over time to adapt to the nutrient-poor, sandy and lateritic soils.

It is unfortunate that, since the 1830s, this wonderful corner of Australia has been subject to extensive and tremendous change, which threatens the survival of many unique plant species. European settlement in the area began in 1829, which signalled the large-scale clearance of land for agricultural and urban development. Today, throughout the drier inland wheat belt region, over 80 percent of the natural vegetation has been cleared for agriculture, while most parts of the moister coastal areas between Geraldton and Albany have been likewise cleared to cater for urban expansion and agriculture. The remaining bushland is fragmented and degraded, being surrounded by grazed areas and cleared pasture, rendering it vulnerable to further human interventions. In many areas, stock and feral animals have destroyed habitat by trampling, over-grazing and introducing exotic weeds. Clearing of the vegetation has led to rising groundwater levels, resulting in increased soil salinity, and destroying the low-lying habitats which are favoured by some species. Terrestrial orchids are particularly susceptible to rising salinity. In more recent times, habitat destruction caused by mining has become a significant threat. One of the biggest threats has been the spread of the root-rot fungus *Phytophthora cinnamomi*, commonly known as dieback, through much of the region's bushland, which has the potential to kill up to 40 percent of the native species, including the state's iconic Jarrah forest. On top of all these problems, global climate change causes uncertain weather conditions and increasing periods of drought which threaten to overturn the delicate balance for survival for all plants.

In the face of these threats, it is not surprising that those orchid species, which live in these habitats and have been considered common up until a few years ago, are

now becoming less so and have progressively become rare. A prime example is *Caladenia huegelii,* one of the state's largest Spider Orchids, which was probably once abundant within the original mixed *Banksia* and Jarrah woodland of the Swan Coastal Plain, between Perth and Bunbury, but is now restricted to a few small bush remnants, isolated by residential areas and farmland. Then there are those species which are naturally rare due to a limited or small population size – these have become vulnerable or critically threatened, and some have become extinct.

Threatened and Priority Flora

Under Western Australian legislation, the *Wildlife Conservation Act 1950* provides for the protection of plant and animal species, which are under identifiable threat of extinction, are rare or are in need of special protection. In Western Australia, the term Declared Rare Flora is applied to threatened flora, and the State Minister for the Environment can declare a species as "Rare Flora" if it fulfils the criteria. Such a plant may not be removed or collected from anywhere (including private land) without the permission of the Minister. As of 6 November 2012, 413 plant taxa, including 39 orchids, are listed as threatened flora. The threats faced by a species are reviewed and prioritised by a scientific panel according to the International Union for Conservation of Nature (IUCN) Red List criteria. Once listed and ranked (as either critically endangered, endangered or vulnerable), resources and expertise are directed to the conservation of the species. The State Department of Environment and Conservation (DEC) develops a species-specific plan, called an Interim Recovery Plan (IRP), which identifies the threats faced and recovery actions required. Such an IRP runs for an initial period of 5 years, at the end of which the objective is to either downgrade the threatened status of the species (that is, the plan has been successful) or revise and re-implement the plan for a further 5 years (further recovery work is required).

While DEC resources are understandably geared towards conservation of threatened flora, there are still many species which are known from only a few collections or sites, but have not been fully surveyed to assess their conservation status. Such plants may be rare or threatened, but cannot be declared as rare flora until proper assessments have been undertaken. These species are listed as Priority Flora. The Western Australian Herbarium's Florabase currently lists 2946 plant taxa, including 56 orchids, as Priority Flora. Priority flora are ranked in five classes.

Priority 1 taxa are poorly known species, known from one or a few collections or sight records, on lands not managed for conservation and under immediate threat of habitat destruction or degradation.

Priority 2 taxa are those known from one or a few collections, some of which are on lands not under imminent threat.

Priority 3 taxa are those known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat.

Priority 4 taxa are adequately known and include (a) rare taxa which have been adequately surveyed, or for which sufficient knowledge is available, and are considered not currently threatened or in need of special protection, but could be if circumstances change; (b) near threatened taxa which have been adequately surveyed and that do not qualify for Conservation Dependent status, but that are close to qualifying for Vulnerable; or (c) taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Priority 5 taxa include conservation dependent taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxa becoming threatened within five years.

The ADORP project

The task of protecting such a large number of threatened and priority flora is undoubtedly huge. In view of the limited resources available to the DEC, which is necessarily focussed on implementing recovery programs for threatened plants, it is unsurprising that little time and effort is available for the 56 priority orchid species. The need for help in assessing the conservation status of these priority orchids was recognised, and the DEC duly undertook to collaborate with volunteers of the Western Australian Native Orchid Study and Conservation Group (WANOSCG), to obtain better and up-to-date population, threat and survey information. In 2011, the *Adopt an Orchid Project* (ADORP) began, with volunteers adopting a species or group of species to undertake monitoring and surveys. The project covers priority 1 to priority 3 taxa, that is, those species with very little information or that are possibly most at risk.

Nominated DEC and WANOSCG co-ordinators, in cooperation with DEC regional staff, oversee the project by managing small groups of volunteers (no more than 6 individuals per group) who have the task of collecting information for their adopted orchid species. Prior to registration, group members agree to adhere to ADORP and DEC protocols and guidelines, agree to provide report forms on a quarterly basis, and to contact the DEC District Flora Officer who will help plan the trip(s) and discuss hygiene matters and follow precautions when entering sensitive (dieback) areas. Following registration, each group or individual is provided with an information pack which contains: a general introduction to the project, Threatened and Priority Report Forms and the field manual, contact details for the DEC District Officer, information on identifying the orchid(s), including photographs, descriptions, life cycle information (flowering time, fruiting), known locations of the


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species, type(s) of habitat to survey, and threats to the plants to be identified. At each site, the group fills out a Threatened and Priority Report Form, by providing precise co-ordinates of the location, information on the number of flowering, vegetative and fruiting plants, associated species (if known), habitat details, and threats observed. Digital images are to be taken for the site, of each plant (to aid confirmation of identification), as well as any threats that are observed. All sites are surveyed and reported, regardless of success or failure in locating the orchid. The reports, images and additional information are sent to the WANOSCG co-ordinator, who then forwards them to the DEC co-ordinator for distribution to the DEC staff and entry in the Threatened and Priority Flora database. The DEC staff review the information and implement any corrective or recovery action.

When the project began in 2011, there were 21 participants in 10 ADORP groups covering 11 species. At last count, there are 56 participants in 22 groups covering 29 species, stretching from Kalbarri in the north of the region to Esperance in the south-east. In the 16 months that the project has been running, over a hundred priority orchid populations have been monitored and a number of new populations have been located.

The lead author of this article, Jeremy Storey, is a volunteer with the group which has adopted two orchids, *Thelymitra yorkensis* Jeanes (a priority 3 species) and *Caladenia postea* Hopper & A.P.Br. (priority 2).

Thelymitra yorkensis, also known as the York Sun Orchid, is a striking plant first discovered in 1991 by Les Robson. At the time, it was mistaken for *T. dedmaniarum*, but is now recognised as a different species. There are 2-8 large, cinnamon scented flowers, which open freely in warm weather. The colours of the perianth segments are typically orange to dark brown, with a distinctive broad yellow stripe on each petal and sepal. This beautiful species is confined to a small area south-west of York, approximately 95 km inland to the east of Perth (Fig. 4), where it inhabits granite or free-draining lateritic soils in Wandoo woodland.

Prior to the start of ADORP, a total of twenty sites were listed in the DEC records. Details of these locations, which were derived from a variety of sources including Western Australian Herbarium records, observations by the DEC staff and surveys by contract staff, included directions to the sites together with their longitudes and

Fig. 1: *Thelymitra yorkensis*
Fig. 2: *Caladenia postea*
Fig. 3: Volunteer (John Hills) searching in *Thelymitra yorkensis* habitat

Photos by Jeremy Storey

latitudes. A review of the data showed that, in six cases, the same location was listed twice and, in one case, the directions differed from the latitude and longitude by nearly 10 km. This left a total of fifteen possible locations. In 2011, volunteers searched eight of these sites, and found a single plant at one site and 15 plants at another. Prescribed burning prevented most of the other sites from being surveyed. Further surveying was carried out in 2012 on three of the previously unchecked sites, and one plant was found. The two sites where plants were found the previous year were also revisited. In total, after 6 man-days of searching, the presence of *T. yorkensis* has only been confirmed at three locations, and the highest number of plants seen in the two years has been 37, with 31 of these being at one site.

The failure to relocate populations previously listed in DEC records may be in part due to the sometimes meagre or difficult-to-decipher historical location details. However, given the large areas searched in the vicinity of the recorded locations, this seems unlikely to be the sole explanation. The countryside where *T. yorkensis* is located is fairly inaccessible, with, apart from changed fire regimes through prescribed burning, little evidence of the sites being damaged by humans or animals. Many of the locations were verified in a survey carried out in November 1996, when large numbers of flowering plants were found. Since that time, the south-western region of Western Australia has become progressively drier and significantly warmer and this may be the cause of the reduction in plant populations. However, it is also possible that plants are surviving vegetatively and will flower well again in years of better winter rainfall. It is also worth noting that very few fertilised flowers were

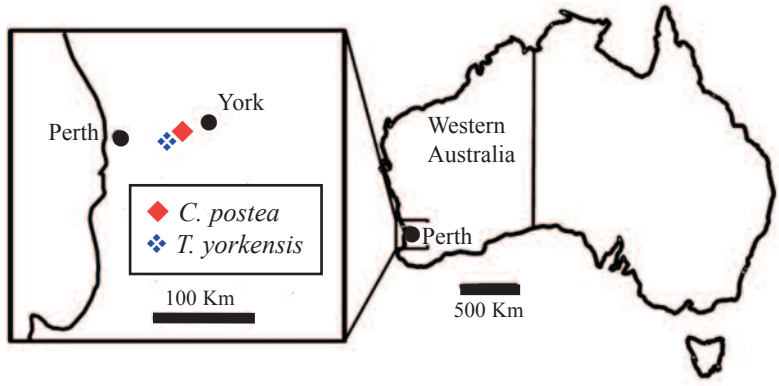

Fig. 4 (above): Location of orchids studied in the ADORP project
Figs. 5 & 6: Volunteer (J Storey) searching in *Caladenia postea* habitat

Photos by John Hills


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observed, which may reflect concurrent reduction of pollinator habitat. Whilst work to date confirms that *T. yorkensis* is rare and more than warrants its priority status, there are large areas of potentially suitable habitat which have not yet been searched. It is to be hoped that future surveys in years of better rainfall will identify further populations and that more rigorous monitoring can be undertaken of the known populations.

Caladenia postea, locally known as the Dark-tipped Spider Orchid, is a distinctive but poorly known species, with 1 or 2 cream coloured flowers and relatively short arching dark-tipped tepals. The dark glandular tail filaments have a bristly appearance. This species is also recognised by its late flowering time (late October to November), and appears to grow in a limited area of seasonally damp Wandoo woodland near York.

Five locations for *C. postea* were supplied by the DEC to the ADORP volunteers. These were all searched in 2011 and plants found at every location, although in one case the plants were found in an area more than 0.5 km from the location given and thus constituted a 'new' population under DEC guidelines. Satellite imagery (Google Earth) was used to identify other prospective areas based on comparison with the known locations. The search of three of these prospective areas yielded just one new location and at this site only a single plant was found. In all, just under 150 plants were found, although in many cases these 'plants' were not individuals but clumps. Further surveys were carried out in 2012, with five sites revisited and one new site discovered. The main threats to the populations appear to be off-road drivers and grazing by animals, but in both cases these are minor. As with *Thelymitra yorkensis*, very few fertilised plants were observed and this may constitute a more serious threat.

There are still prospective areas to be surveyed and hopefully further populations will be discovered. In addition, some sites need to be revisited since the presence of another small late-flowering white *Caladenia* species (thought to be late-flowering *Caladenia pendens* subsp. *talbotii*) at the sites has caused some confusion. It is worth noting, in this respect, that while *C. postea* officially flowers in late October-November, observations over the last two years suggest flowering occurs mid October-early November.

Summary

The ADORP project is proving to be a very important source of data on otherwise poorly known orchid species, which enables the DEC to understand their conservation status and undertake any corrective or recovery actions as appropriate. For the participants, the experience has been fun and rewarding, seeing rare orchids in the wild and working as a team with other dedicated orchid enthusiasts and conserva-

tionists. This collaborative program is immensely valuable, enabling the public to make significant contributions to conservation efforts in partnership with government, which ultimately benefits the entire community.

Acknowledgements:
We would like to acknowledge and thank Kim Hanson, WANOSCG co-ordinator and an instigator of ADORP, who has put tireless hours into the project; and John Hills, WANOSCG volunteer, for additional images.

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Members Photographs and Personal Websites
Mike Gasson

HOS members include many keen photographers as is obvious in the annual Photographic Show. Also some of our members have personal websites where their work can be seen. As I have a perpetual problem in filling the last few pages of each *JHOS*, I am planning to include examples of members' photography. As a first move the following page has samples sent in by Barry Taylor and a couple taken from a website set up by Francis Buckle: www.ringouzel.smugmug.com. If you are interested in having a few of your photos in *JHOS* do send or e-mail a few images.

Fig.1: Fragrant Orchid Fig. 2: Frog Orchid
Fig. 3: Burnt Orchid Fig. 4: Sword-leaved Helleborine
Photos by Barry Taylor (Figs. 1 & 2) and Francis Buckle (Figs 3 & 4)


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Response to "Much Ado About Almost Nothing? Part 3."

John Sumpter and Alan Parfitt

We have enjoyed, and learnt a lot from the series of articles by Svante Malmgren and John Haggar about various aspects of the genetics of hybridisation of native orchids. Part 3 (Malmgren & Haggar 2013) was devoted primarily to a discussion of the wider implications of introducing foreign DNA into our native orchid populations, perhaps as a consequence of planting out in the wild artificially propagated orchids originating from foreign seed (the authors are both experts at propagating orchids from seed). In their article, there is considerable discussion about the status of the Military Orchid (*Orchis militaris*) in Britain. We wish to make two points arising from their article.

The first point concerns their opinion that "The Chiltern Military Orchid looks like a plant that could be about to embark on a final decline due to its poor, inbred genetic constitution". We do not believe that the evidence supports that pessimistic view. If the authors had been aware of the current status of the Military Orchid in the Chilterns, they may not have made that statement. The most up-to-date, publically available information on the status of the Military Orchid in the Chilterns can be found in Sumpter *et al*. (2004). That paper provides all available historical data on the situation of the Military Orchid in the Chilterns, and data up to 2003, when 130 plants flowered at Homefield Wood and 25 at the other site, the latter number being the highest yet recorded at the site. However, the situation is different now, and this has relevance both to the specific point about possible "terminal decline" and to the more general issues addressed by Malmgren and Haggar (2013). In 2012, 180 Military Orchids flowered at Homefield Wood. At the other site, 324 flowered; a 13-fold increase in the 10 years since 2003. This represents an average annual increase during that decade of over 30%. These figures do not suggest that the Military Orchid is in "terminal decline" in the Chilterns. In fact the current situation is more encouraging than it has been for over half a century, and possibly much longer.

The second point concerns the quality of the seed collected from Military Orchids in the Chilterns. Seed was collected from plants at both sites. Malmgren and Hagger (2013) say "…the Chiltern seed is of poor quality in our experience. There are few seeds in each capsule and many of them have undeveloped embryos. Many seedlings grown from the seed lack vigour and some are deficient in chlorophyll. Survival of the seedlings is poor". Based on their experiences of growing Military Orchids from Chiltern (not foreign) seed, it is easy to understand how they reached their opinion of the likely decline and loss of the Chiltern Military Orchid populations. But that opinion does not fit well with the persistence of those two populations for a long time – one for over 40 years, the other for over 65 years – and the recent dramatic increases in the sizes of the populations at both sites. How have those increases occurred if the seed is of such poor quality?

Robust plants of *Orchis militaris* growing in the Chilterns
Photos by Helen Sumpter

We have discussed the likely reasons for the increases in size of the two Military Orchid populations in our previous paper (Sumpter *et al*., 2004). We believe that a combination of appropriate management of the sites, including scrub removal and winter grazing, together with protection of the flowering plants and hand-pollination of the flowers, is most likely responsible for this conservation success. In particular, we think that hand-pollination has played a very significant role. This procedure has been implemented considerably more at the private site, where the largest increase in orchid numbers has occurred. Of course it is not possible to relate cause and effect conclusively, but nevertheless it is possible to say that the conservation practices have been very successful. Some seed must be viable to produce healthy plants, otherwise the populations could not have increased as they have.

One question for Malmgren and Haggar is whether or not they think their propagation procedures are optimal for successful germination and culture of Chiltern Military Orchid seed. Put another way, it is possible that their procedures, although successful for many species of orchid, are less than optimal for Chiltern Military Orchids?

Finally, some general comments on the Military Orchid and other rare native orchids. Many of these orchids became rare as a consequence of loss of entire populations due to changes in agricultural practices, as with both the Military Orchid

and the Monkey Orchid (*Orchis simia*) in the Chilterns. The best conservation strategy for these orchids is to establish them on more sites. To date, despite the appreciable increase in the number of Military Orchids in the Chilterns, the species is confined to two sites, as it has been for decades. Identifying other suitable sites for this (and other?) species, and then getting viable populations established at these sites, must be the most important goal. Obviously such sites could be planted with plants grown artificially, a strategy that has been successful with the Lady's Slipper Orchid. This is where the techniques developed by Malmgren and Haggar could be extremely useful. Whether those plants are of native stock or of foreign stock seems unimportant to us, as it does to Malmgren and Haggar.

As a postscript, a provisional count of the number of Military Orchids in 2013 suggests that around 700, in total, flowered at the two Chilterns sites. This is a 39% increase on the 2012 number.

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