

A close-up photograph of a purple orchid flower. The petals are a vibrant purple with a fine, granular texture. The center of the flower, the labellum, is a pale yellowish-white color with a distinct, darker yellowish-green central column. The background is black, making the colors of the flower stand out.

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Cover Photographs

Front Cover: *Gymnadenia conopsea* close-up showing the column and the two stigmatic lobes left and right of the spur entrance.

Back Cover: *Neottia ovata*, flower.

(See pollination article on page 130)

Photos by Jean Claessens & Jacques Kleynen.

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 Members' Handbook, website www.hardyorchidsociety.org.uk, 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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Editorial Note

Mike Gasson

This issue features another excellent pollination article from Jean Claessens and Jacques Kleynen with more of their exceptional photography – too good not to use on the covers of this issue! They also have some great video footage available on YouTube with some of them mentioned in their article. I will aim to get a comprehensive set of links set up on the HOS website to help getting to them – there is already a general link to pollination videos on the home page. Elsewhere we have an Australian conservation theme with another article from George Tiong with Graeme Lamont and news of an important new book on conservation methods authored by fellow countrymen Nigel Swarts and Kingsley Dixon. As has been the trend of late we still have a healthy stock of submitted articles but do keep them coming in as it is the life blood of *JHOS*. Even though there may be a delay I always try to get articles into print as soon as space allows.

Chairman's Note Colin Scrutton

My predecessor has warned of the danger of damaging other flora when photographing orchids. Just as important is to respect structures such as gates, walls and fences. We have just returned from our third trip to Lesbos, an island well known for species of *Himantoglossum*. Two years ago, we found an excellent pair of spikes of *H. comperianum* 4m back behind a roadside chain-link fence in a rocky alcove, difficult to photograph with an ordinary lens but my telephoto lens produced fine results through the meshwork of the fence. Later that trip we discovered that someone had smashed down the fence to get at the spikes! This year, the fence had been repaired and the area behind had been filled in with cut tree trunks, rocks and soil. So that act of vandalism has resulted in the destruction of a good site for that relatively rare orchid. Apart from that, and the break-in to our car on the first of our two trips this year (an unheard of event on Lesbos), we photographed a good haul of orchids on this beautiful island. Perhaps one more trip to capture the earliest flowering species would be good but the urge to explore pastures new is strong!

There is a wealth of interesting and useful information in the Society's journal and preceding newsletters. I have been compiling an index of the original articles in these publications to make the contents more easily accessible (that is excluding book reviews and field trip reports). I realise that some members have compiled their own index, but I am intending that my efforts will be available on the website as a pdf download for the benefit of everyone. I have created an author index which is straightforward and a subject index which presents more of a problem in terms of depth of content versus length. It will be posted around the end of this year when I have indexed part 4 of the current volume. Thereafter, I will update the file as each subsequent volume is completed. I will be happy to receive comments from members, particularly on the utility of the subject index.

After a very successful introduction at the November meeting last year, the next Scientific Show will be at the Autumn Kidlington meeting on November 19th 2017. Requests for displays went out on the forum in July and the details for entries are on the website. Having missed the show last year, I'm looking forward to viewing the entries this year, so if you haven't yet prepared your A2 poster for the show, when you read this, time is getting short to compile and submit your entry!

Alan Bousfield (alan.bousfield@ukgateway.net) does an excellent job as Field Meetings Co-ordinator. However, he can only put together a good programme of field trips with the input of the Society's membership. I would draw your attention to the notice he posted in *JHOS* 14 (3) on page 86 and in the current volume (page 113). It would be useful if members, particularly perhaps newer members, could suggest

to Alan species they would like to see on field trips and/or locations they would like to know more about. With this information Alan would be able to search for leaders willing to organise and run appropriate trips. Now would be a good time to contact him with next year's programme in mind. We would like to maintain a healthy Field Trip programme for future years.

Angela and I have recently attended the seed sowing workshop and it was most impressive, organised by Alan Leck and run by John Haggard with support from David Cooper. What particularly struck me was how potent it is in attracting new members. Of the 15 participants, 12 were new members who had joined with the principal interest of attending the workshop. Of the eight workshops run so far, around a third to a half of the participants were new members. Long may it continue!

The Leeds meeting this year was very successful with over 50 registrations and an interesting and varied programme. The new Video Competition had three excellent entries, a good cross section of the sort of videos we would like to encourage for the competition. The winner of the Tony Hughes trophy, kindly donated to the Society by Celia Wright, was Malcolm Brownward with a delightful review of the orchids of Hartslock. We will show his video at the November Kidlington meeting, where Malcolm will be presented with the trophy. We hope that many more members will submit videos for the competition next year.

Next year will be the 25th anniversary of the founding of the Hardy Orchid Society, inaugurated at a meeting of the Newbury Horticultural Show on 26th of June, 1993. The Committee is currently exploring appropriate ways to celebrate this event, both at the three 2018 meetings and in the Journal. So watch out for further information on the website and the forum, and note the meeting dates for next year which are: Kidlington Spring Meeting - April 15th 2018; Leeds Meeting - September 1st 2018; Kidlington Autumn Meeting - November 18th 2018. I hope there will be a particularly good turnout at the anniversary meetings.

Field Trips – Your Help Required!

Alan Bousfield

I try to arrange about ten field trips each year to various locations across the country. From the low attendances to some 2017 field trips, I can only assume members are looking for new and different locations. So if you know of a suitable location for a field trip in 2018 and are willing to organise one, please contact me: alan.bousfield@ukgateway.net. In addition, suggestions are welcome on where members might like to go and what they would like to see on a field trip.

Mallorca, March –April 2015
Les Lewis

A tour of Mallorca with my wife in Spring 2015 provided an opportunity to seek out some of the local orchids, especially Balearic endemics. After several nights in the attractive capital city of Palma, we made our first orchid trip en route to our next hotel in Peguera on the south-east coast. Our destination was the pine woods along

the Calvia to Puigpunyent road in the hills north-west of Palma. Here, we found *Ophrys bombyliflora* (Fig. 3), an attractive bicolour form of *Anacamptis longicornu* (syn. *A. morio* subsp. *longicornu*) (Fig. 4) and, growing in grassy scrub, *Neotinea conica* (syn. *Orchis conica*) (Fig. 1).

However, of particular interest was a small number of a Pseudophrys with a curved labellum and white or blue omega (Fig. 2). The identity of such Pseudophrys on Mallorca is problematic. They are often listed as *Ophrys dyris* and *Ophrys fusca*; see, for example, Beniston & Beniston (1999: pp36-37), Delforge (2006: p378, p424) and Moingeon (online), although Delforge (2016: pp424-425) subsequently listed them as *O. dyris* and *O. × brigittae* (= *O. dyris* × *omegafifera*). However, other authors consider them to be – or at least include – *O. lupercalis* (Stökl 2007; Ayasse et al. 2010) or *O. vasconica* (Vicens 2014). As explained by Mast de Maeght and Presser (both online), the lips of these Mallorcan plants have a shallow basal groove which is absent from “true” *O. dyris*. Instead, they consider them to be a taxon intermediate between *O. dyris* and

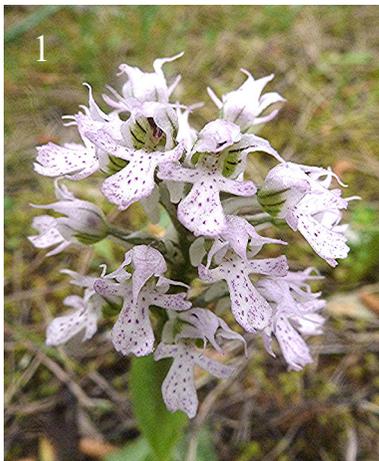


Fig. 1 : *Neotinea conica*, Calvia, 30 March 2015
 Fig. 2: *Ophrys funditorum*, Calvia, 30 March 2015
 Fig. 3: *Ophrys bombyliflora*, Calvia, 30 March 2015
 Fig. 4: *Anacamptis longicornu*, Calvia, 30 March 2015
 Fig. 5: *Ophrys tenthredinifera* subsp. *spectabilis*, Es Capdella, 30 Mar 2015
 Fig. 6: *Ophrys speculum*, Cala Sant Vicenç, 1 April 2015

O. lupercalis which they suggest could be considered a separate species, probably of hybrid origin. In line with this, Mast de Maeght lists them under the *nomen nudum* “*O. funditorum*”: in view of the difficulty of being more precise, this is the name which is used below.

From the Calvia road, we drove further west towards Andratx. The speciality here is the Mallorcan endemic *Ophrys tenthredinifera* subsp. *spectabilis* (syn. *O. spectabilis*) (Fig. 5) which we found growing under pines near Es Capadella. This subspecies has a few flowers which are longer than those of the nominate species and usually spaced out along the stem. The other orchids we found here were *Neotinea conica* and *Himantoglossum robertianum*. Although *O. tenthredinifera* subsp. *spectabilis* also grows among the pines bordering the road north of Andratx, we failed to find it there – unfortunately the best known site (and locus classicus) at Coll de sa Gramola had been destroyed by a forest fire.



On a trip to the north-east of the island, we visited the small fishing village of Cala Sant Vicenç set in a rocky inlet near Pollença. Here *Ophrys speculum* (Fig. 6) and *Ophrys tenthredinifera* s. str. (= subsp. *tenthredinifera*) (Fig. 8) were frequent along a path bordering the woods on the south side of the inlet.

From there, we visited the Parc Natural de s’Albufera Reserve, near our next hotel close to Can Picafort on the north-east coast. This Reserve is best known for its birds but also contains several species of orchid. We did not have to wait to find the first ones – driving along the main road through the recently extended south of the Reserve, it would have been difficult to miss several hundred *Himantoglossum robertianum* (Fig. 9) growing conspicuously in a roadside meadow. Nearby, on a drier part of the meadow bordering the



Fig. 7: *Anacamptis palustris* subsp. *robusta*, Can Picafort, 1 April 2015

Fig. 8: *Ophrys tenthredinifera*, Cala Sant Vicenç, 1 April 2015

Fig. 9: *Himantoglossum robertianum*, Can Picafort, 1 April 2015

Fig. 10: *Ophrys incubacea*, Can Picafort, 2 April 2015

Fig. 11: *Ophrys balearica*, Mondrago, 3 April 2015

Photos by Les Lewis

road, there was a mixed population of *O. speculum* and *O. tenthredinifera*. Further into the Reserve, another meadow was covered with several thousand tiny *O. bombyliflora* var. *parviflora* with a lip typically only 4-6 mm long. In a wetter area of this meadow, there were a few spikes of the strongly growing *Anacamptis palustris* var. *robusta*, a speciality of the Reserve; unfortunately, these were still only in bud (Fig. 7). Outside the Reserve, in a pine wood between the coast road and the sea, we found more *O. tenthredinifera* and *O. speculum* and a single "*O. funditorum*" (see above) bordering the paths. Of more interest since it is rare on Mallorca, we came across a small population of the Dark Spider Orchid, *Ophrys incubacea* (Fig. 10) growing in a grassy clearing.

Our final hotel was just outside Santanyi, not far from the beautiful Parc Natural de Mondrago on the south-east corner of the island. This Reserve is again best known for its birds but is also very good for orchids. Our main target here was *Ophrys balearica* (syn. *O. bertolonii* subsp. *balearica*), a Balearic Islands endemic with a metallic grey speculum. Disappointingly, we had failed to find this earlier in our trip even though it is not uncommon on the island and was known from some of the sites we had visited. Eventually, after a long search among the pines, we found just a single specimen (Fig. 11). Much more easily found were *O. bombyliflora*, "*O. funditorum*", *O. tenthredinifera*, *Anacamptis longicornu*, *Serapias lingua* (Fig. 12) and *S. parviflora* (Fig. 13).

A further orchid at Mondrago was an early flowering form of *Anacamptis pyramidalis*. However, this was more easily seen bordering the waterside path to the fishermen's huts in the attractive fishing village of Cala Figuera nearby. These plants had relatively large pale flowers, including white ones (= subvar./lusus *albiflora*) (Fig. 14). As reported by Presser (online), this early form grows at low altitudes in the south of the island, usually near the sea, and flowers from mid/late March to mid/late April, whereas the normal form does not begin to flower on Mallorca until the beginning of May. He suggests that this early form should be treated as a new regional subspecies but does not give it a new name.

Our final orchid trip was a detour to Son Gual on the way back to the airport to see another Balearic endemic. This was *Ophrys fabrella* (Fig. 15), a Pseudophrys with usually just one or two small, yellow-edged flowers. The few specimens we found growing in light scrub were accompanied by larger numbers of *O. bombyliflora*, *O. speculum* and *S. lingua*.



Fig. 12: *Serapias lingua*, Mondrago, 3 April 2015
 Fig. 13: *Serapias parviflora*, Mondrago, 3 April 2015
 Fig. 14: *Anacamptis pyramidalis* (early form), Cala Figuera, 3 April 2015
 Fig. 15: *Ophrys fabrella*, Son Gual, 4 April 2015
 Photos by Les Lewis

Acknowledgement

I am grateful to C.A.J. (Karel) Kreutz for detailed site information without which we would not have seen many of the orchids.

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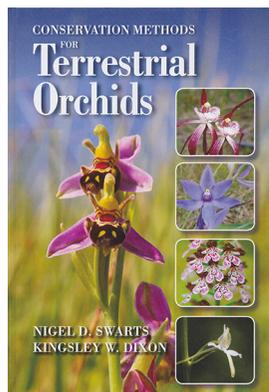
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Book Review: “Conservation Methods For Terrestrial Orchids”

Mike Gasson



“*Conservation Methods For Terrestrial Orchids*” by Nigel D. Swarts & Kingsley W. Dixon. 235 pages Published 2017 by J. Ross Publishing, Florida, U.S.A. ISBN-13: 978-1-60427-123-2 Available from www.jrosspub.com Also from Amazon at £49.80 & NHBS at £49.95

This is an interesting and somewhat unusual publication, produced as a high quality hardback book that will offer much of value to many members of the Hardy Orchid Society. As its title suggests it addresses the conservation of orchid species that are within the realm of our interests.

It is special in that this is addressed in a comprehensive way, covering every aspect of its subject with an up to date and thorough approach. This begins with monitoring orchid populations but extends to investigations of mycorrhizal associations. Of especial relevance to HOS, orchid seed germination is addressed and again there is an invaluable chapter dealing specifically with the importance of mycorrhiza in this context. The details here and the descriptions of fungal isolation methods are particularly valuable insights. Orchid cultivation does not tail off at the seed germination stage as the challenging aspects of transfer to and growth in soil are addressed in detail. Translocation of orchids as a conservation measure has its own chapter, again of especial interest to HOS as it is something in which we are engaged. Orchid pollination is dealt with in good detail, clearly something that needs to be effective if an orchid population is to survive in the longer term. Molecular genetic approaches are also covered with a brave attempt to explain methodologies that can be challenging to the non-specialist. The last chapter deals with orchid seed and fungus storage to complete an impressive overview of all that the orchid conservationist might want to know. There is also a comprehensive reference list and a well constructed index.

The main text in the book is nicely written and very readable but it is a publication with a rather complex structure. Text is interrupted with additional embedded elements, including a series of case studies contributed by additional authors. At a first reading they can prove rather intrusive as they often involve a rather abrupt change in writing style. Whilst some add valuable extra dimensions, others seem to add less of substance. In general, the case studies have the feel of conference abstracts added in by way of illustration and as such they have the disadvantage of providing limited detail, leaving the reader interested but looking for more. As the book has its conceptual origins in a conference held in Perth and two Australian authors, it is unsurprising that most of the case studies are drawn from non-European examples. However, notable exceptions are a description of Dave Trudgill’s orchid meadow in Scotland and an informative piece on the use of genetic techniques to investigate the provenance of *Cypripedium calceolus* in the UK. With respect to this last example and from a parochial perspective, one area of the book that might have been treated in greater detail is the whole issue of hybrid vigour and inbreeding versus outbreeding depression. Its impact on conservation strategies is something that has exercised contributors to *JHOS* and remains a challenging and often controversial aspect of conservation genetics with some prime examples in the UK.

The other inclusions within the main text are welcome and useful additions. Text boxes are used to provide concise summaries of detail and there are many invaluable, detailed techniques scattered throughout the chapters and presented as “procedures” differentiated with a pale grey background. In general, the book is well illustrated throughout both with photographs and some especially thoughtful and informative colour drawings.

As already mentioned the book was inspired by the inaugural “International Orchid Conservation Congress” held in Perth, Australia in 2001 and more specifically an associated techniques course. The authors have done the orchid world a great service by creating a book that will transfer their knowledge to a much wider global audience. For anyone involved in or interested in orchid conservation this is a must have book but there are elements of great value to others; both the generalist and especially anyone interested in terrestrial orchid cultivation. It might best be regarded an invaluable reference manual but the main text is very well written and the book does reward a cover to cover read.

Two last things; the foreword provides a strong endorsement from Sir David Attenborough and the book is dedicated to Holger Perner who was known to several HOS members and will be greatly missed by the orchid world.

In summary this is a book that the orchid enthusiast really does need to have, especially so if conservation and/or cultivation are interests.

**Orchid Conservation in Australia:
The Grim Tale of the Sunshine Diuris (*Diuris fragrantissima*)
George Tiong & Graeme Lamont**

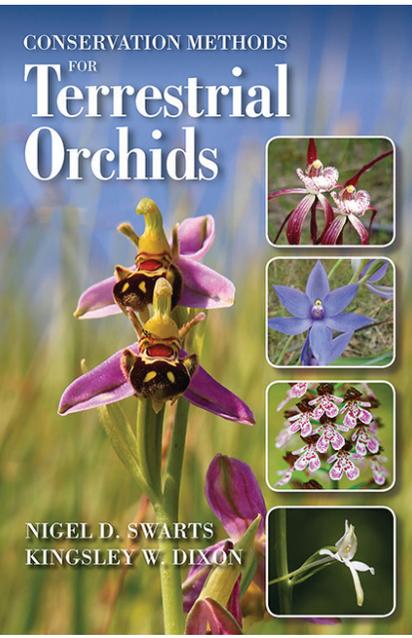
Australia is home to more than one million species of plants and animals, making it one of the most important countries on Earth in terms of biodiversity. About 85% of the continent’s flowering plants, 84% of mammals and over 45% of birds are endemic, meaning that they are found only in Australia, which makes their conservation all the more essential.

However, over the 200 years since European settlement, the widespread clearing of native vegetation has removed, changed or fragmented habitats for plants and animals alike. Human activities (including land clearing for agriculture and housing purposes, mining, introduction of animals which become feral, and the spread of invasive weeds and diseases) and natural events (such as fire, drought and flood) continue to change the ecology of the land. These changes have a profound effect on the interactions of plants and animals that live within those ecological communities, reducing diversity of species and threatening their survival. Since European settlement, hundreds of species have become extinct in Australia, including more than 60 plant species. It is likely that more plant species have likewise disappeared without our knowledge. At present, the survival of many other species is considered to be under threat, and they are listed accordingly under Australian Government legislation (the Environment Protection and Biodiversity Conservation Act 1999). There are six different categories of threatened species under the Act, namely: extinct; extinct in the wild; critically endangered; endangered; vulnerable and conservation dependent. Currently, over 1180 species of native plants are at risk of disappearing. Out of this total, no less than 228 species of orchids are classified as threatened.

The threats faced by a species are reviewed and prioritised by a scientific panel (known as the Threatened Species Scientific Committee) according to the International Union for Conservation of Nature (IUCN) criteria for assessing a species for inclusion in the IUCN Red List. The advice is then provided to the Minister for the Environment to make the final decision. Once listed and ranked under the Act, resources and expertise are directed to the conservation of the species.

The conservation advice provides guidance on immediate recovery and threat abatement activities that can be undertaken, and includes practical on-ground activities that may be implemented by local communities, natural resource management groups or interested individuals. The advice may also include broader management actions which can be undertaken by local councils, government agencies or non-government organisations to protect the species on a regional level. In many cases, a recovery plan is developed to assist in recovery.

A completely unique handbook from the experts!



“This authoritative and magnificent book is the work of many years of two well-respected scientists in the field who clearly share a life-time passion for terrestrial orchids. It describes breakthrough orchid research that now make it possible to propagate even the most recalcitrant of species.” —Sir David Attenborough, From the Foreword

KEY FEATURES

- Offers methods and techniques that will appeal to multiple end users through its detail, utilization of modern technology, simplicity, and ease of application across species from different parts of the world
- Features beautiful color illustrations and photographs outlining procedures and concepts
- Provides stand-alone guidance in each chapter and collectively enables practitioners to undertake what were previously considered complex scientific procedures
- Includes over 25 relevant case studies to illustrate key principles and success stories in orchid conservation, written by world leaders in orchid conservation practice and science
- Relates many of the techniques and procedures to epiphytic orchids to increase the appeal of the book to all orchid conservationists

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From a conservation viewpoint, many of the threatened orchid species that used to be quite commonly seen up until a few years ago, are now becoming less so due to the changing habitat, and have progressively become rare. On the other hand, 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.

The predominantly Australian genus *Diuris*, often locally known as Donkey Orchids in reference to their ear-like petals, includes a couple of species that would be amongst some of the most widely seen terrestrial orchids, yet there are several species which are critically endangered or nearly extinct. As with most other native orchid species, the reasons behind this high level of threat are probably multi-factorial and sometimes unclear, but are undoubtedly hampered by our limited understanding of the ecological importance of soil material and soil microbe interaction requirements which affect plant growth.

This article highlights the sad plight of one of the most beautiful orchid species found in Victoria, *Diuris fragrantissima* D.L. Jones & M.A. Clem, affectionately called the Sunshine Diuris, and outlines the efforts undertaken to save it from extinction.

Diuris fragrantissima is a slender plant, with two linear, channelled, grass-like green leaves, each measuring up to 18 cm long and 1 cm wide. The sturdy, green coloured flowering stem can reach 20 cm tall and bears 1-7 (average 4) strongly fragrant flowers. The flowers are large, measuring about 3.5 cm across, and are coloured white with variable purplish hues and streaks, while the lateral sepals are green. The dorsal sepal is triangular and erect, while the lateral sepals are long, slender (at about 70 mm long), and are obliquely decurved, drooping and parallel (which give rise to the nickname 'Fragrant Doubletail'). Each ovate petal is erect or recurved, with a short green stalk which expands into the blade. The labellum has conspicuous purple streaks and blotches, and is strongly bilobed, with the lateral lobes curved upward, while the fan-shaped mid-lobe is wrinkled and projects forward. Flowers tend to open sequentially up the stem, with the lowest flower often having collapsed before the top flower buds have opened. Following late autumn rains, the leaves emerge from the underground tuber. Flowering occurs in spring (late October to early December). If pollination has occurred, seed capsules would ripen about 6 weeks after. The tuber remains dormant underground until the following autumn.

The relationship of *Diuris fragrantissima* with the mycorrhizal fungus *Tulasnella calospora* is not fully understood. However, it is known that initiation of seed germination and assimilation of nutrients by the orchid seedling are dependent on the presence of the mycorrhizal fungus. The degree of dependence upon the fungus

Diuris fragrantissima
Photos by Colin and Mischa Rowan



in mature plants is unclear. Pollination is undertaken by a small native bee, with the purplish colour of the flowers mimicking the colour of native lilies that often grow with *Diuris* species. The bee may also be attracted by the strong fragrance of the orchid. Very low natural rates of pollination have been observed, with a maximum of only 7% of flowers producing seed pods, which is a reflection of the rarity of the orchid and consequently few opportunities for pollinators to find flowers. Flowering also appears to be enhanced by a hot bush fire during the preceding summer. Fires may indirectly promote seed germination and seedling establishment by altering soil nutrient levels and by reducing competition from associated grasses.

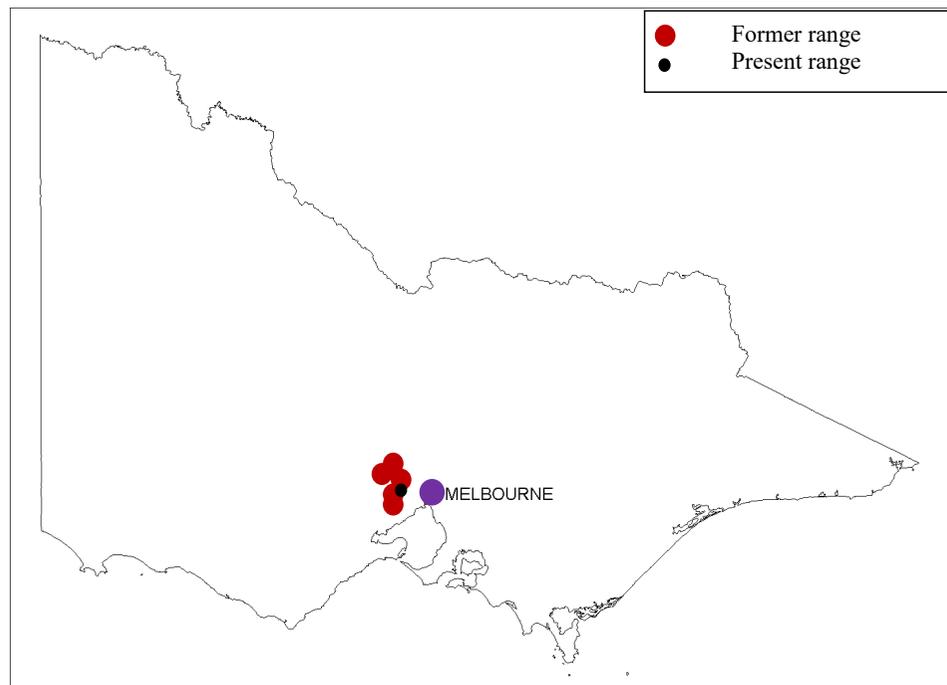
This plant was once very common throughout the grasslands of the Keilor-Werribee Plains, north-west of Melbourne in Victoria. The typical habitat is heavy, red-brown or black basalt loam soils, with embedded basalt boulders, in open grassland plains dominated by Kangaroo Grass *Themeda triandra*. Indeed, around the time of European arrival, it was so abundant that the floral displays were often referred to as “Snow-in-the-Paddocks” and plants were dug up for home gardens. Since then, the species has suffered a catastrophic decline in range and abundance, and is now close to extinction in the wild. *Diuris fragrantissima* is presently listed as Endangered under the Commonwealth EPBC Act 1999 and Threatened under Victoria’s Flora and Fauna Guarantee Act 1988. Most plants that were dug up did not survive long in cultivation; however, the decline of the species was accelerated by widespread habitat destruction and land degradation. Currently, a number of major threats are identified, including competition from weeds, predation from introduced herbivores, and the lack of fire and ill-timed fire.

A state-based Recovery Plan was prepared and implemented between 1998 and 2002 to assist in the recovery of the species. Furthermore, in 2008, a revised and updated National Recovery Plan was documented, which details the recovery objectives and actions to ensure its long-term survival. A key objective identified in the National Recovery Plan was to establish several self-sustaining populations of this orchid in the wild. The *ex situ* population of *Diuris fragrantissima* at Melbourne Zoo and the Royal Melbourne Botanic Gardens was established specifically for re-introductions of this species to the wild. Using *in vitro* propagation techniques, the number of plant seedlings in cultivation was boosted to about 3000, with attention paid to maintain genetic diversity. Concurrent studies looked at developing techniques for inoculating seedlings with the symbiotic mycorrhizal fungus. This research aims to increase the likelihood of successful reintroduction efforts, focussing on determining the genetic relatedness and variability of the population to increase diversity and maximise long term viability.



Reintroducing *Diuris fragrantissima* plants at Laverton North Grassland Reserve (bottom) and planting companion plants (top).

Photos by Colin and Mischa Rowan



Distribution of *Diuris fragrantissima* in Victoria

Today, a single remaining natural population of *Diuris fragrantissima* is found at Sunshine, about 11 kilometres to the west of Melbourne (see map above). About 30 plants survive at the small government rail works site on public land. Members from the conservation arm of the local native orchid society, the Australasian Native Orchid Society (Victorian Group) Inc., have been particularly involved in surveying the plants and monitoring the threats on an ongoing basis. The specific risks to the plants arise from construction workers or delivery people who might not understand the conservation value of the site. Following negotiations, a larger area, which encloses the orchid population, is now security fenced and excluded from the construction zone. Volunteers undertake regular weeding of the site and, where possible, organise controlled burns in order to stimulate plant growth.

In the early 1980s, an introduced population was established on Crown land at the Laverton North Grassland Reserve, Altona, and managed by Parks Victoria. More plants were planted out in ensuing years, however they died out. Further seedlings were planted, and today about 40 plants survive. Records suggest that plants may

have been lost to predators or the micro-habitats selected were too dry, while weeds, caterpillars and slugs as well as rabbits and mice continue to be threats. With the availability of some grant money to the orchid society, the group has employed a contractor to support the existing volunteer weeding and undertake weed eradication surveys, as well as implement more targeted and effective remedial measures to protect the plants.

Recently, the reintroduction of plants, at a couple of other native grassland sites within the previous distribution range of the species, has also been attempted, and met with varying degrees of success. The extended drought has had a significant adverse effect on plant numbers, which suggests that the reintroduction strategy needs to cover a wider range of micro-habitats, in order to achieve a more balanced outcome, so that plants can better survive the wet or dry years.

By proactively addressing the threatening processes which affect the survival of the small populations of these endangered plants, as outlined in the Recovery Plan, it is to be hoped that the populations can become sufficiently viable and stable which will ensure the long-term preservation of this beautiful orchid species in the wild.

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We are indebted to Colin & Mischa Rowan (<http://www.retiredaussies.com/index.htm>) for providing the images to illustrate the article.

The Pollination of European Orchids Part 6:

Nectar As Attractant: *Gymnadenia conopsea* and *Neottia ovata*

Jean Claessens & Jacques Kleynen

Attracting potential pollinators is vital for orchids, for most rely on insects for the transport of the genetic material, the pollinia or pollinaria. Nectar is an important attractant that serves as a food reward for the visiting insects. In this part of our series we will discuss two quite different ways of offering nectar to the visitors, illustrated in *Gymnadenia conopsea* and *Neottia ovata*. We will also discuss how this affects the potential visitor spectrum.

Neottia ovata, the Common Twayblade

Although this common orchid can grow up to 60 cm, it is quite inconspicuous, because all flower parts are uniformly green. Characteristic are the two basal, egg-shaped leaves opposite to each other. It has a long flower spike with many flowers.



Fig. 1: *Neottia ovata*, flower detail; the stigma is already covered with pollen fragments.

Fig. 2: *Neottia ovata*, column; the pollinia are extracted with the help of a needle.

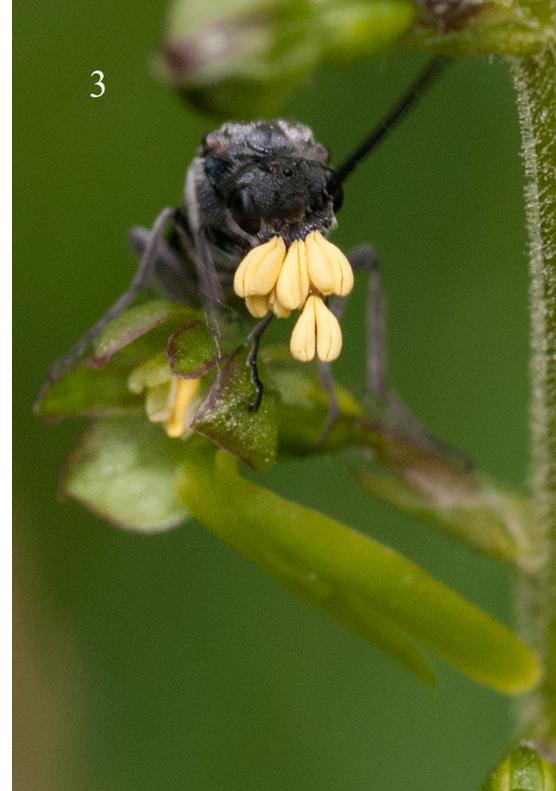
Fig. 3: *Dolerus aeneus* carrying several pollinia of *N. ovata*.

Fig. 4: *Tenthredopsis* sp. with various pollinia attached to its head.

Fig. 5: Ichneumon wasp, licking the lip for nectar.

Fig. 6: *Cantharis rustica* pollinating *N. ovata*.

Photos by Jean Claessens & Jacques Kleynen



The perianth segments form a very loose hood; the lip is yellow-green, strap-shaped and sharply bent down and backwards near the lip base. A slightly raised, linear, nectar-secreting zone runs down the centre of the lip. The lip base is slightly hollow, this is a second zone where a fair amount of nectar is produced. Both nectar sources are freely accessible to a wide range of insects.

The column is quite special and characteristic for the genus. The pollinia are not connected to a caudicle or a viscidium, as in most orchids, but lie free in a gutter-shaped white structure, the rostellum. The rostellum consists of very long cells, filled with a viscid fluid. On top of the rostellum is a very sensitive, protruding tip. Under the rostellum lies the trapezoidal stigma, glistening with stigmatic fluid. Insects that land on the lip or the flower, start licking the nectar that is secreted on the lip. They can enter the flower upright or upside down, but they all follow the nectar trail and eventually turn towards the lip base, where the extra nectar supply is exposed. While licking, they touch the extremely sensitive tip of the rostellum, and in a split second the viscid fluid is expelled, taking the pollinia with it and adhering to the visitor's body. We filmed this fascinating strategy, a video is on Youtube: "Orchid pollination 11: Pollinia removal in *Neottia ovata*". Depending on the size of the insect, the pollinia can stick to various parts of the body, but usually they are fixed on the head. If the insects react immediately, they can remove the load, but the viscid fluid hardens within seconds. After this the pollinia can no longer be removed, even when grooming intensely.

N. ovata is most visited by ichneumonids, sawflies and beetles (Youtube: Orchid pollination 6: Pollination of *Neottia ovata* by various insects), but the list of other pollinators is long. This orchid attracts a wide range of insects, due to its freely accessible nectar and unspecialised pollination mechanism: any insect that touches the rostellum can act as pollinator. This is in contrast with the specific relationship that exists in other genera, where only specific insects can act as pollinator, e.g. the adaptation of *Cypripedium calceolus* or *Cephalanthera* flowers to certain bees (Claessens and Kleyen 2013).

***Gymnadenia conopsea*, the Common Fragrant Orchid**

G. conopsea is also a large orchid, growing up to 60 cm tall. It has long, narrow, lanceolate leaves in two facing rows. The inflorescence is rather long and dense with up to 50 flowers. The flowers vary from rosy to reddish pink and pink-purple. Upper



Front Cover: *Gymnadenia conopsea*, close-up showing the column and the two stigmatic lobes left and right of the spur entrance.

Fig. 7: *Gymnadenia conopsea* in its biotope, Dolomites (Italy).

Fig. 8: *Siona lineata*, Black-veined Moth pollinating *Gymnadenia conopsea*

Fig. 9: *Zygaena purpuralis* with pollinaria of *Gymnadenia conopsea*.

Photos by Jean Claessens & Jacques Kleyen

sepal and petals form a hood over the column, the lateral sepals are spreading. The lip is three-lobed, usually broader than long and ends in a long, slender, downward pointing spur, partly filled with nectar. The column is erect and has an anther with two pollinia connected to a caudicle and a naked viscidium, that is the viscidium is not covered by a bursicle or a membrane. The two viscidia are placed in the spur entrance at its upper side. The stigma is not under the anther, but instead forms two large stigmatic lobes left and right of the anther and a small third lobe in the spur entrance.

The flower morphology is well adapted to its main pollinators: Lepidoptera like the Silver Y (*Autographa gamma*), the Painted Lady (*Vanessa cardui*) or the Hummingbird Hawk Moth (*Macroglossum stellatarum*). The long, slender spur is only accessible for butterflies or moths who can reach the nectar with their long proboscis. The viscidia are in such a position that the proboscis of a visiting butterfly will touch them when probing the spur for nectar. The viscidia are long and narrow, well designed to adhere on the proboscis. When withdrawn from the anther, the pollinaria make a forward and sideward bending movement. This explains why the stigmatic lobes are placed left and right of the column. The butterflies are attracted by means of scent (the flowers produce eugenol which is quite attractive to the butterflies) and are rewarded by large quantities of nectar. A pollination video is on Youtube: "Orchid pollination 14: Pollination of *Gymnadenia odoratissima* by *Zygaena lonicera*". *G. conopsea* attracts diurnal as well as nocturnal pollinators, a strategy positively influencing the pollination rate.

In special conditions there can be a shift towards other pollinators: we observed in one season that bumblebees were the main pollinators of a population of *G. conopsea* in the Netherlands (Claessens et al., 2014). Due to the shortage of other pollinators the nectar level in the spur was so high, that bumblebees could reach the normally inaccessible nectar. Normally the flower structure selects a specific group of pollinators, a contrast with *N. ovata*, in which flower structure allowed a large and heterogenous group of insects to reach the nectar and serve as pollen transporter. Despite the different pollination strategy both species attract a large number of pollinators and show a high fruit set.

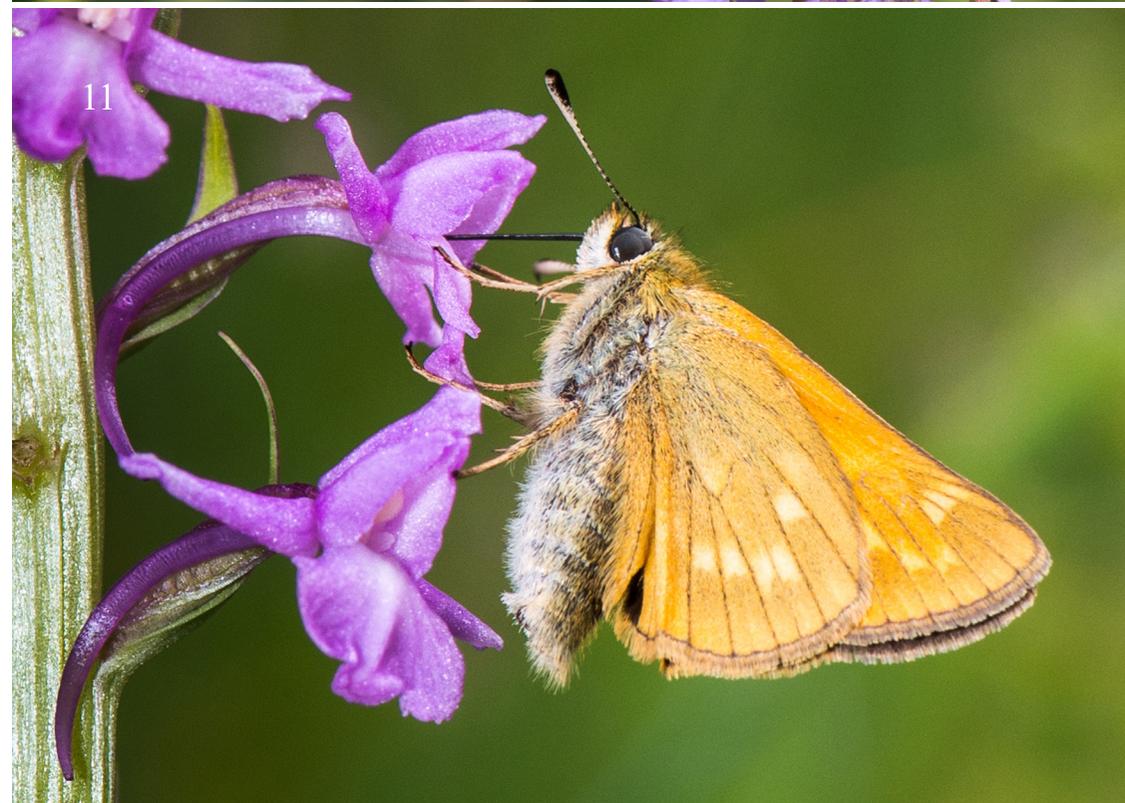
Acknowledgements

We would like to thank Mike Gasson for improving the manuscript. Also thanks to Nick Owens and Tony Irwin for their help with the identification.

Fig. 10: *Aglais urticae*, the small tortoiseshell pollinating *Gymnadenia conopsea*

Fig. 11: *Ochlodes sylvanus* pollinating *Gymnadenia conopsea*

Photos by Jean Claessens & Jacques Kleynen



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A Discovery of *Serapias lingua* in Essex Sean Cole & Mike Waller

On 19th June 2017 two photographs were posted on the “Wild Flowers of Britain and Ireland” group on Facebook, asking for an identification. The caption simply said “near Tiptree, Essex”. The photographs clearly showed at least 40 flowering spikes of *Serapias lingua*, and the surrounding vegetation appeared to confirm that this was not a hoax, as it also showed a number of native British species. Due to the potential magnitude of the find, and the fact that the plants were on private land, the post was removed and the finder was silent to requests from interested parties. Despite requests from MW and SC, no further information was forthcoming, so we decided to do some research. We felt it would be important to at least verify the sighting somehow, and if potentially naturally occurring, get to the bottom of the origins of the plants.

Through various contacts and channels, we managed to narrow down the search for the locality, and SC visited with Brian Laney on 27th June to search for the plants. The habitat certainly looked correct, as did the associated species mix, but unfortunately a three hour search of a relatively large area revealed nothing. Reasonably certain that we were in the right place, and with some slightly more specific directions now from SC, MW revisited on the evening of the 28th June and managed to stumble on the plants by lining up background vegetation with one of the original photographs.



The colony was confined to a very small area of vegetation in a slightly damper hollow, and was almost swamped by surrounding low-growing Willow *Salix*. By the 28th they were almost over, with just three plants having any valid flowers left visible. There were 61 flowering spikes plus several blind leaf rosettes. The undamaged plants ranged from 9 – 26 cms (to the nearest cm). The size distribution is as follows (figures are height in cms followed by number of plants

Serapias lingua near Tiptree in Essex
Photos by Sean Cole (Figs. 1 & 4) and James Pickerin (Figs. 2 & 3)



in brackets): 9(2); 10(3); 11(1); 12(3); 13(3); 14(3); 15(5); 16(5); 17(1); 18(5); 19(5); 20(6); 21(2); 22(11); 23(1); 24(2); 25(1); 26(3) (Total 61 plants).

The most common pollinator of *Serapias lingua* is the Bee *Ceratina cucurbitina*. The flower emits a pheromone that attracts the males of the species, depositing the pollinia on the forehead of the insect. However, this species does not occur in the UK, so reproduction by pollinator is highly unlikely. There was no sign of any swollen ovaries by 30th June, so the colony presumably formed into its current numbers via vegetative reproduction. This strategy is known as a technique used by the species to reproduce when colonies are small or isolated.

Having confirmed the record, we felt it would be useful to try and establish origins if possible. Adjacent to some fishing lakes, the area is used by local residents to walk dogs but the colony was some way away from the nearest path so had remained unnoticed until its discovery during an ecological survey; the land was earmarked for potential development. The vegetation on the site had arrived naturally and was not seeded after its last use as a strawberry field, approximately ten years ago. It was then rented out to a local farmer as a permanent setaside. It has been mown annually since in late June or early July. In the immediate vicinity of the *Serapias* were: *Helminthotheca echinoides* (Bristly Oxtongue), *Vicia hirsuta* (Hairy Tare), *Bellis perennis* (Daisy), *Trifolium repens* (White Clover), *Trifolium dubium* (Lesser Trefoil), *Cirsium arvense* (Creeping Thistle) and *Salix cinerea* (Grey Willow). Approximately 100m away was a small colony of seven Bee Orchids. There was no evidence of garden escapes or other introduced species across the site.

Given the lack of likelihood of a spike setting seed, a token specimen of the above ground parts has been taken and we hope genetic analysis will be done to investigate which variety or subspecies of the plant they are. *Serapias lingua* is common in cultivation and is perfectly capable of surviving in the UK climate provided it is a frost free environment. It reproduces easily and frequently in this situation. The specific variety kept is not usually named.

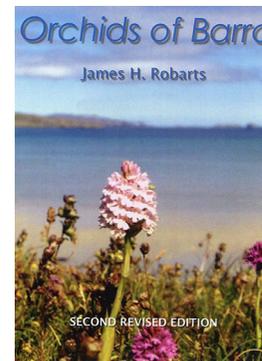
A small colony of *Serapias lingua* is extant in Sussex, at Wakehurst Place, among planted *Anacamptis laxiflora*. However, numbers have diminished over time. The only other records are of a single plant discovered in Guernsey in 1992 which has never reappeared, and a multi-stemmed plant in a farm meadow in South Devon discovered as a triple spike in 1998 and which lasted until 2003 when it had seven flowering spikes. The latter plant was determined as being of the North African origin from a sample obtained, but no photographs of it *in situ* have ever been published. The origin of the three previous records has never been discussed in detail, but all are of course open to some doubt given the frequency of the species in horticulture and the circumstances and/or location in which they have occurred. *Serapias lingua* is

primarily a Mediterranean species, but does occur further north in France. The origin of the Tiptree plants will never be known for certain, but at very least the colony is naturalised and apparently surviving healthily. It will be interesting to see what happens to the site in terms of the potential development, and whether the presence of these plants will have any effect on the planning decision. Unfortunately due to their unproven origin, however, we suspect not.

Acknowledgements

Thanks to Jonathan Greenwood, Gareth Knass, James Pickerin, Jon Dunn, Byron Machin and several members of the HOS for information and advice regarding these plants.

Book Review: *The Orchids of Barra* David Hughes



“The Orchids of Barra” Second Revised edition - James H. Robarts
Price £4.95 on sale at Barra Tourist information, Castlebay, Barra or by post with extra for delivery: ecoin@vabv.org.uk.

Dr Robarts, a GP in East Lothian, retired to the island of Barra where he developed his knowledge of the local orchids and in particular researched the locally frequent *Spiranthes romanzoffiana*. As I write this review on the island in July I can assure readers that there are sufficient orchids on Barra to merit its own book. While species are limited to only 12 plus numerous hybrids, quantities are massive, colourful and dramatic. Each species is simply described, as are five hybrids. Dr Robarts takes trouble to distinguish the *Dactylorhiza incarnata* subspecies; *coccinea* being by far the most prolific. This is very much *Dactylorhiza* territory. In particular *D. fuchsii* ssp. *hebridensis* grows widely through the machair and grazed grassland, while colonies of *D. viride* often accompany it. Each orchid is photographed, the pictures are not the best, being rather blurred, although those supplied by Barry Tattersall are noticeably better. The book starts with a description of orchid characteristics, very simple but clear. This should be read with advantage by anyone wishing to understand this family better. There are articles on the research Dr Robarts conducted into the fertility of Irish Ladies Tresses (*Spiranthes romanzoffiana*), a local speciality. This is particularly suited to the long cultivated, drained and base rich lazy beds. I am happy to recommend this little book which tells the reader all that is needed to know about the orchids of this beautiful island. Also, the publishers have advised the book has recently been reprinted with improved photographs perhaps addressing the above reservation about their quality.

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