Journal of the HARDY ORCHID SOCIETY

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The Hardy Orchid Society Committee

Front Cover Photograph

Neil Hubbard's *Orchis simia*, first placed winner in Class 9 of the HOS Summer Plant Show. Full details of the show results on page 113 and on the HOS website where there are images of all entries as well as the judge's comments.

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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.

Contents

Editorial Note

Mike Gasson

We have a couple of bigger but rather different articles in this *JHOS*. David Trudgill gives us an in-depth account of how temperature impacts orchid flowering time and the maturing of seed capsules using his own and published data for *Platanthera bifolia* and *Ophrys sphegodes.* In something of a contrast, Colin and Angela Scrutton take us away from the UK with a detailed travelogue that features their experiences in Turkey and includes a comprehensive set of their orchid photos. Articles are rounded off by John Grimshaw who draws attention to the fact that there is already a Ghost Orchid out there with the latin species name '*roseum*'. We have included results and a few images from the recent Summer Plant Show and the whole of that event is covered on the HOS website. Note that we do now have a password-protected area on the website (see page 113) that includes digital versions of all recent *JHOS* issues, including this one. There was a Forum discussion on this recently, so hopefully we have addressed requests from some Members for a non-paper *JHOS* version. As mentioned last time we are planning a fifth *JHOS* this year so there is a need to keep material coming in for issues through 2022.

Chairman's Note
Carol Armstrong

How have you been keeping? I hope you have had orchid interests to pursue even though many indoor events were still being cancelled throughout the summer. The Hardy Orchid Society provided its membership with interesting articles in the Journal, some of which will inspire future self-guided trips. The outdoor meetings Field Trip programme of walks led by members of HOS achieved visits to familiar and new sites as well as privileged access to warden-guided sites – a brilliant result. There were two virtual plant shows in Spring and Summer that allowed growers of a larger range of species to participate by using photographs. Then we were able to run our indoor Seed Sowing Workshop which was fully subscribed. The HOS Northern Meeting with Video Competition was planned as an indoor meeting (with a back up of an alternative online meeting). It was with great delight that I was able to welcome members and speakers to the first such meeting for 21 months.

Congratulations to the overall winner of the two plants shows, Neil Hubbard, and to the joint winners of the Video Competition, Alan Gendle and David Pearce. I'm looking forward to seeing the Autumn Meeting Photographic Competition entries.

Most of us have had an orchid summer in which we stayed within our national borders, and this was noticeably reflected in the Video Competition submissions. The Photographic Competition entries could have a similar theme. As much as we may miss being able to travel to Europe and further afield, this has been a year in which we have discovered more about the orchids on our doorsteps, (some of us have very big doorsteps!). Certainly, I have enjoyed seeing many species for the first time in the UK.

All of our activities this year have had to be slightly adapted or have a virtual option prepared. Through the efforts of the Committee we have had the opportunity to read and talk about orchids with each other. The Southern Autumn Meeting is planned to be indoors at Kidlington as in many years previously. This can still change before November 21st, but I hope to see old friends and make new ones there.

I wish to say a big "Thank You" to all the Members of the Committee for continuing to look for solutions to the changing restrictions during the pandemic, so that our Society has been able to share and celebrate our passion for orchids.

Finally, please consider if you can help the HOS – with written articles, being prepared to give presentations (live or virtual), be a field trip leader or assist the Committee by joining us to fill the roles that are or will become vacant soon. This is particularly true for the Treasurer, Plant Show Secretary, Video Competition Organiser, Meetings Sound & Projectionist posts.

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Password for Members' Area of HOS Website: ghost2021

A Members' area has been added to the HOS website with digital copies of all recent *JHOS* issues and details from the recent Plant Show. An archive of some online presentations from Leeds and Kidlington will be added once an updated web video player is in place.

HOS Video Competition 2021

The competition was held at the Leeds meeting on the 4th September and there were five entries. Congratulations to the joint winners:

Alan Gendle for 'HOS Field Trip 10th/11th July 2021'
David Pearce for 'Wolstonbury Orchids 2021'

As David was not at the meeting the Tony Hughes Trophy was presented to Alan Gendle who will pass it to David at a later date.

Kidlington Arrangements November 2021

Enclosed with this Journal is a booking form for the late autumn meeting at Exeter Hall, Kidlington on Sunday 21st November 2021.

Please be aware that although we will strive to make our late Autumn Meeting as normal as possible, we will have to work within current guidelines.

We expect the total capacity of the hall to be less than usual, so please don't leave it to the last minute to book.

We request that you do not attend unless you are fully vaccinated. Alternatively you could take a lateral flow test before coming to the meeting and only come if this is negative.

You will only be able to make use of a Members' Sales Table if you have booked it in advance; we will not be able to accommodate unbooked Member's Sales on the day.

If you have any queries or concerns, please email Simon Tarrant, Southern Meetings Organiser (hosos@hardyorchidsociety.org). If we are holding your payment for the cancelled Spring 2020 Meeting, Simon will email you direct to agree a course of action.

Results of HOS Plant Show 2021

Due to Coronavirus restrictions the 2021 Plant Show was held as an online digital event with entrants submitting photographs of their plants for judging.

Class 5: One pot native British orchid.
1st Neil Hubbard: *Goodyera repens*

Class 6: One pot native European (not native to Britain) orchid.
1st Stephen Clements: *Himantoglossum jankae*
2nd Neil Hubbard: *Ophrys sphegodes* ssp. *aesculapii*

Class 7: One pot non-European orchid.
1st Stephen Clements: *Pogonia ophioglossoides*
2nd Neil Hubbard: *Disa uniflora*

Class 8: One pot *Dactylorhiza.*
1st Neil Hubbard: *Dactylorhiza romana*
2nd Paul Redshaw: *Dactylorhiza majalis* × *maculata* Westerley Strain
3rd John Haggar: *Dactylorhiza* Skelsey (*D. iberica* × *fuchsii*)

Class 9: One pot *Orchis*, *Anacamptis* or *Neotinea.*
1st Neil Hubbard: *Orchis simia*
2nd Stephen Clements: *Orchis anthropophorum*
3rd Barry Tattersall: *Neotinea tridentata*

Class 10: One pot *Ophrys.*
1st Neil Hubbard: *Ophrys speculum*

Class 11: One pot *Serapias.*
1st Neil Hubbard: *Serapias cordigera*

Class 12: One pot *Cypripedium.*
1st Stephen Clements: *Cypripedium* Sabine
2nd Paul Redshaw: *Cypripedium calceolus*
3rd Neil Hubbard: *Cypripedium calceolus*

Class 14: One pot *Pleione.*
1st Stephen Clements: *Pleione* Glacier Peak Everest

Class 15: One plant or pan of plants raised from seed by the grower.
1st Neil Hubbard: *Dactylorhiza fuchsii*
2nd John Haggar: *Dactylorhiza* Odessa (*D. iberica* × *praetermissa*)

Class 18: One pot *Epipactis.*
1st Stephen Clements: *Epipactis catalina* Chris (Best in Show)
2nd John Haggar: *Epipactis* Passionata (*E. palustris* × *royleana*)

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Class 19: Any plant or group of plants cultivated by the entrant within their garden setting planted in a flower bed or tub.
1st Barry Tattersall: *Orchis purpurea*
2nd John Haggar: *Dactylorhiza praetermissa*, *D. praetermissa* var. *junialis* and hybrids
3rd Neil Hubbard: *Epipactis palustris*

Winner of Best in Show Trophy:
Stephen Clements for *Epipactis catalina* Chris in Class 18

Banksian Medal

As announced previously, The Banksian Medal for 2021 was to be won by the exhibitor gaining most points at the two virtual shows combined. Points awarded are: 5 for First; 4 for Second; 3 for Third in Classes 1 to 4 and for all other Classes at the rate of 3 for First, 2 for Second and 1 for Third. Points awarded at the shows were:

Entrant	Spring	Summer	Total
Nigel Denman	1		1
Neil Hubbard	23	24	47
Stephen Clements		17	17
John Haggar		7	7
Barry Tattersall	28	4	32
Paul Redshaw		4	4

Congratulations to Neil Hubbard as winner of the Banksian medal.

Thanks to all exhibitors and especially to our Judge Nick Fry.

Some first-placed winning entries are displayed on the following pages identified by the Class in which they were entered. The cover of this *JHOS* features Neil Hubbard's *Orchis simia*, first-placed winner in Class 9, and the HOS website has photographs of all the first-placed plants as well as an overview of all entries with images and the Judge's comments.

Fig. 18: *Epipactis catalina* Chris shown by Stephen Clements (Best in Show).
Fig. 5: *Goodyera repens* shown by Neil Hubbard.
Fig. 10: *Ophrys speculum* shown by Neil Hubbard.
Fig. 8: *Dactylorhiza romana* shown by Neil Hubbard.


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Temperature and Orchids 2: Development and Distribution

David Trudgill

Temperature has a major influence on orchid development, growth and distribution. How orchids respond to different temperature regimes reflects the environments to which they are adapted. Species that are adapted to cool conditions such as *Platanthera bifolia* (Lesser Butterfly-orchid) become dormant in autumn and require a period of chilling before growth restarts in the spring (Trudgill 2020). Others, such as *Ophrys sphegodes* (Early Spider-orchid) are adapted to warmer conditions and start to grow in the autumn. In this article I explore the effect of differences between years and regions in mean temperatures during the growing season on the time of flowering of *P. bifolia* and *O. sphegodes*, and the maturing of the seed capsules of *P. bifolia*.

Thermal-time.

There is a temperature below which plants will not grow. This temperature varies with the species and the climates to which they are adapted. It is known as the base or threshold temperature (Tb) and tends to be close to 0ºC for species adapted to cooler, northern latitudes but is often higher for species from further south. Above Tb, as temperatures increase, plants will progressively grow and mature more quickly at all temperatures up to their thermal optimum. The relationship between temperature and time taken for each developmental stage, including flowering and development to maturity, is measured in degree-days (ºCdays). The numbers of ºCdays required to complete a particular stage of development is termed the 'thermal requirement'. More information on thermal-time can be found from the online version of 'Plants In Action' (plantsinaction.science.uq.edu.au. Chapter 14.3.2) and Trudgill *et al*. (2005).

The thermal requirement is expressed in ºCdays. For a process such as development to flowering it is calculated as follows:

Thermal requirement = Nº of days from onset of growth to flowering × Mean temperature – Tb

If the thermal requirement is the same for all temperatures between Tb and the thermal optimum it is known as the 'thermal constant'. If the thermal constant has been determined it can be used to predict the timing of flowering when Tb and the mean temperature of the environment are known. Conversely, if temperature and flowering dates are available for different sites and/or for several years, the timing of flowering can be used to estimate Tb and the thermal requirement, and to explore whether the latter is constant. This is the approach I have used here.

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Field study at Blairgowrie exploring the influence of temperature on, and thermal-time requirement of *P. bifolia*.

Methods and assumptions.

Each year between 2012 and 2020 I have recorded when the *P. bifolia* (Fig. 1) in our meadow (near Blairgowrie, 56.59ºN, alt. 50m) produces its first fully open flower and when the seed capsules start to mature (Fig. 2). For my temperature calculations I have used the mean monthly temperatures from the met. station at Leuchars on the coast 50km to the south east (56.38ºN, alt. 10m). However, I have decreased the Leuchars temperatures to allow for the altitude (50m) of our meadow (assuming a 1.0 ºC decrease for every increase in altitude of 150m). More recently, I have also accessed mean daily temperature records from the met. station at the James Hutton Institute at Invergowrie (altitude c. 30m), c. 26km to the south east of Blairgowrie. I have similarly decreased these values (by 0.13ºC) to allow for the altitude difference between the James Hutton Institute (hereafter Hutton) and our meadow at Blairgowrie.

Figure 1. *Platanthera bifolia* fully in flower in our meadow at Blairgowrie.The other flowers are a *Dactylorhiza* hybrid and two *D. fuchsii*.
Photo by David Trudgill

To determine whether the thermal requirement is constant, I have calculated the number of ºCdays accumulated up to the date when *P. bifolia* first flowered and when the first seed capsules reached maturity (defined as when the first capsules start to turn brown – see Fig. 2). I have used 1st April as the start date for my calculations to allow for winter chilling and because *P. bifolia* typically does not emerge in our meadow until late April.

Figure 2. Capsules of *P. bifolia* starting to change colour and classified as 'mature'.
Photo by Andy Scobie

Blairgowrie Results – Flowering

The dates of first flowering ranged from 30th May to 15th June (Table 1). However, I have omitted the flowering data for 2015 from some subsequent calculations as there seems to have been a mis-match between temperatures recorded at Leuchars and those in Blairgowrie. For every year except 2015 the estimated degree-day (ºCday) requirement to first flowering was almost a constant (Table 1) when calculated using the temperature records from both Leuchars and Hutton (603ºCdays and 627ºCdays respectively from 1st April with Tb = º0C).

Regressing the corrected mean temperatures from Leuchars against the dates of first flowering from 1st April showed that time to first flowering was very strongly correlated with temperature (Fig. 3, $R^2 = 0.91$ - see footnote 1) and that flowering was advanced by c. 7.2 days for every increase of 1.00C in mean temperature (Fig. 3). A regression using the Hutton data produced an almost identical result (y = -7.0x + 132: $R^2 = 0.81$).

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Year	Average Temperature ºC	Flowering Date	Leuchars Data ºCdays	Hutton Data ºCdays
2012	8.13	12 June	585	628
2013	9.09	9 June	615	617
2014	10.07	31 May	596	627
2015	9.75	15 June	703	711
2016	8.99	6 June	583	623
2017	10.07	30 May	587	626
2018	9.81	2 June	599	629
2019	9.34	3 June	587	592
2020	9.45	31 May	576	594
Mean	9.41	5 June	603 (591*)	627 (617*)
* Omitting results for 2015				

Table 1. Mean temperature from 1st April to date of first flowering, and degree-days (ºCdays) accumulated above Tb = 0ºC for *P. bifolia* at Blairgowrie (based on Leuchars met. station) and corresponding degree-days accumulated by the met. station at the James Hutton Institute at Invergowrie.

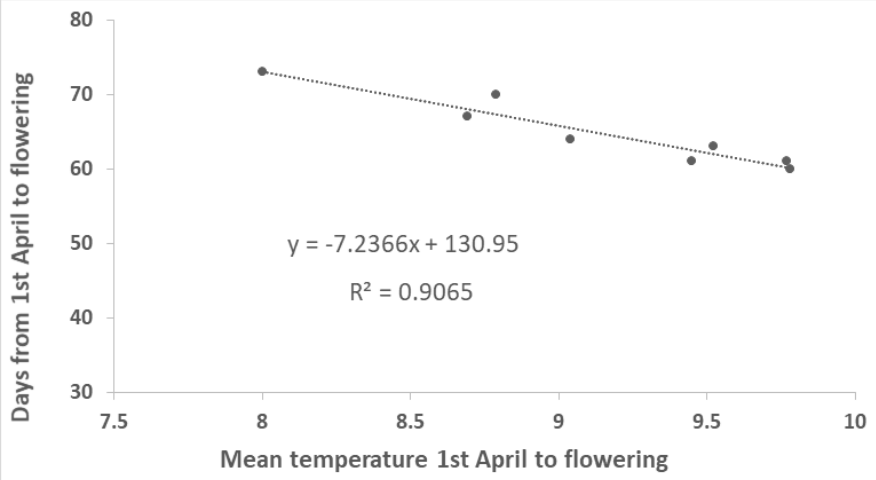

Figure 3. Number of days after 1st April for start of *P. bifolia* flowering regressed against mean temperature (ºC) from 1st April to flowering in 2012 to 2020 (data for 2015 omitted).

Blairgowrie Results – Seed Capsule Maturity

The earliest date when seed capsules started to turn brown was 14th August in 2018 (after a very warm summer). The latest was 10th September in 2015. With Tb = 0ºC and using the corrected Leuchars data a mean of 1775 ºCdays (or 1762 ºCdays if 2015 is omitted) was required (Table 2) and the annual requirement was almost constant. With the Hutton data the degree-day requirements were slightly greater but equally consistent.

Year	Date	Leuchars ºCdays*	Hutton ºCdays*
2012	6 September	1727	1773
2013	25 August	1776	1808
2014	23 August	1819	1887
2015	10 September	1884	1925
2016	29 August	1764	1827
2017	25 August	1819	1867
2018	14 August	1695	1743
2019	23 August	1770	1788
2020	21 August	1722	1776
Mean	26 August	1775	1822
*1st April to maturity			

Table 2. Date of seed capsule maturity and degree-day (ºCday) accumulations above 0ºC for *P. bifolia* at Blairgowrie from 1st April to maturity (based on Leuchars met. station) and corresponding degree-days accumulated by the met. station at the James Hutton Institute at Invergowrie.

Based on Leuchars data the relationship between the time taken from 1st April for capsules to mature and the mean temperature was significant (Fig. 4, $R^2 = 0.68$). Capsule maturity was advanced by c. 12 days for every increase of 1.0ºC in mean temperature. Using data based on Hutton values produced an almost identical regression ($y = -12.6x + 303$: $R^2 = 0.68$).

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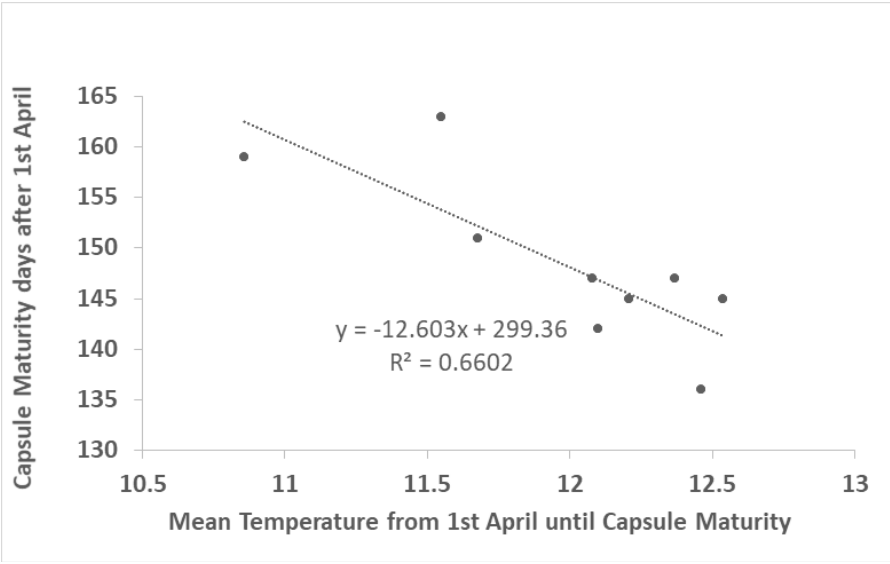

Figure 4. Days after 1st April for *P. bifolia* seed capsule maturity regressed against Leuchars mean temperature (ºC) from 1st April to maturity in 2012 to 2020 (data for 2015 included).

Effect of altitude on *P. bifolia* capsule maturity – Glen Affric in northern Scotland

Harrap & Harrap (2009) report that the highest altitude that *P. bifolia* had been recorded in the UK was 365m above sea-level in Glenfeshie, (57.07ºN) in 1944. However, in 2014 a single plant of *P. bifolia* was found at 513m near Glen Affric (57.460N; A. Scobie pers. comm.). To calculate the total degree-days available annually to this plant (with Tb = 0ºC) between 2012 and 2019 I used the temperature records from the met. station at Braemar (57.0ºN, alt. 339m). As temperature decreases with increasing altitude, I have assumed that the average temperature experienced during the growing season by a plant at 513m was 1.1ºC less than that measured at Braemar (see footnote 2).

The results showed that, with Tb = 0ºC, a plant growing at 513m in Glen Affric would have accumulated an estimated average yearly total of 2163ºCdays (Table 3) and an average of 1810ºCdays between 1st April and 30th September. This is probably more than adequate for *P. bifolia* to be able to complete its reproductive cycle.

Year	Glen Affric Total ºCdays**	Holt Total ºCdays**
2012	1997	1529
2013	2133	1915
2014	2184	1810
2015	2117	1906
2016	2178	1935
2017	2261	1670
2018	2216	1936
2019	2196	+
2020	2193	+
Mean	2163	1814
**1 January to 31 December		+Data not available

Table 3. Total yearly ºCday accumulations for Glen Affric (based on Braemar) and Holt (Norway) with Tb = 0ºC.

Effect of latitude on *P. bifolia* capsule maturity - Holt in northern Norway

P. bifolia grows above the Arctic Circle in the far north of Norway (see Den virtuella floran). There is a representative met. station at Holt (69.65ºN, alt. 12m) close to Tromso from which I accessed the temperature data from 1st January to 31st December for the years 2012 to 2018. This part of Norway is, in most years, cooler than Glen Affric at 513m (Table 3). Assuming Tb = 0ºC the accumulated mean annual total was 1814 ºCdays, slightly more than needed for capsules to mature at Blairgowrie. However, this is only c. 57% of the yearly mean total accumulated at Blairgowrie, and for the decade 1990-1999, with Tb = 0ºC, a mean annual total of only 1639 ºCdays was accumulated – considerably less than the requirement established in our meadow at Blairgowrie. This seems likely to be insufficient to enable *P. bifolia* to reproduce this far north in Norway as the capsules still have to dry and the seeds to be shed.

Thermal-time and flowering of *Ophrys sphegodes* – a 'winter-green species'

Hutchings (2010) recorded, over 25 years, the time of peak flowering of *O. sphegodes* (Early Spider-orchid) in a unique study spanning 30 years (ending in 2006). Peak flowering time varied between 4th and 24th May, but there was a trend for flowering to become earlier as the study progressed. It was relatively easy for me to abstract his dates for peak flowering and to use them in a thermal-time analysis. I used the temperature data from the Eastbourne met. station (21 km to the east of the study site)

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but have made no corrections for altitude differences. For simplicity, and because the data was rather variable, I present averages of the data grouped for the early, middle and final years of the study. At this site the leaves of *O. sphegodes* emerge in early September (Sanger & Waite, 1998). Consequently, I used temperatures from 1st September of the previous year to calculate the total number of degree-days accumulated to peak flowering in May in the following year. As *O. sphegodes* is adapted to warmer conditions than *P. bifolia* I have used two values of Tb (0ºC and 5ºC) when calculating the thermal requirement.

Average temperatures increased by 0.9ºC over the period of the study and this was associated with a decrease of 12 days in mean peak flowering date (Table 4). The ºCdays requirement for flowering progressively slightly increased with both Tb = 0ºC and Tb = 5ºC. Plotting the mean effective temperature (i.e. above Tb) against the date of peak flowering indicated that for every increase of 1.0ºC peak flowering was advanced by 8 days with Tb = 0ºC ($R^2 = 0.59$), and by 10 days with Tb = 5ºC ($R^2 = 0.34$; graphs not shown).

Period (from)	Mean Date of Flowering	Mean Temperature	Mean ºCdays accumulated	
			Tb = 0ºC	Tb = 5ºC
1975-	20 May	8.54	2248 ± 38*	1060 ± 27*
1989-	12 May	9.18	2333 ± 30	1116 ± 30
1997-	8 May	9.43	2378 ± 40	1175 ± 31
* Standard error				

Table 4. Mean date of peak flowering of *O. sphegodes* and mean temperature, and ºCdays accumulated from 1st September to peak flowering in the following May. Results are means of eight (from 1975), eight (from 1989), and nine (from 1997) years respectively. Data from Hutchings (2010).

Discussion and Conclusions

It is clear that orchids will flower, and the seed capsules will mature earlier, in years and areas with warm rather than cool springs and summers. Since the 1970's temperatures in the UK have increased by 0.9ºC, equivalent to moving >200km further south (Trudgill 2021). The results here indicate that flowering of *P. bifolia* was advanced by c. 7 days for every increase of 1.0ºC in mean temperature and that capsule maturity of *P. bifolia*, and flowering of *O. sphegodes* were up to c. 12 and c. 10 days earlier respectively. However, these should not be regarded as precise values both because of the variable nature of some of the data and because the choice of start date for the calculations may be too late.

However, the results do indicate that the thermal requirements for flowering and capsule maturity of *P. bifolia* are close to being constant. If so, these values can be used to help predict how changes in mean temperature during the growing season might affect the phenology and distribution (including the effect of altitude) of *P. bifolia*. With *O. sphegodes* the small but progressive increase in the thermal requirement for peak flowering with increasing mean temperature indicates that another factor may be having a small effect – increasing day-length is one possibility as it is known to influence time of flowering in many plant species (Young *et al*. 2015). Also, it has been suggested that plants possess an internal (circadian) clock that is temperature compensated (McClung 2005).

The conclusion that the thermal requirements for *P. bifolia* are probably constant is supported by the observation in 2014 of *P. bifolia* growing at 513m in Glen Affric. However, this conclusion appears not to be supported by the reports of *P. bifolia* growing above the arctic-circle in northern Norway as, based on the results from Blairgowrie, in many years there appears to be insufficient accumulated heat for the capsules to mature to the point where they can release their seed. There are several possible explanations for the unexpected occurrence of *P. bifolia* in northern Norway. The most likely is that the air temperatures measured at the met. station at Holt underestimated those experienced by the plants at ground level. Temperatures close to the ground are often higher than those reported by met. stations, especially on south-facing slopes (Scherrer & Korner 2010). In studies in the Alps and the Arctic they often observed 2ºC to 4ºC increases in soil temperatures 3cm below the soil surface for several hours around mid-day in summer.

I conclude that, whilst temperature is the major determinant of the timing of flowering and capsule maturity of *P. bifolia*, and flowering of *O. sphegodes*, other local factors may need to be considered, including topography and even the availability of pollinators. Knowledge of the thermal requirements of a species allows us to anticipate its potential to extend its range northwards and upwards. However, a warming climate may not always lead to a northerly extension in the range of a species. Alexandra Bell (2015) made a detailed and comprehensive analysis of the BSBI database for vascular plants. She observed that, as the UK has warmed, the northern range for many plant species has tended to retreat southwards – probably because of the loss of suitable habitat. An analysis of the changing distributions of twenty species of orchids in Britain between 1986 and 2017 found that *Ophrys apifera* (Bee Orchid) and *Anacamptis pyramidalis* (Pyramidal Orchid) had extended their distributions northwards, but the distributions of fourteen species was unchanged, and four species had retracted southwards (Trudgill 2018, & unpublished).

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Footnotes

1) $R^2 = 0.91$. This notation indicates that a best-fit straight line regression accounted for 91% of the variation in the data.

2) Between 1st April and 30th September for the years 2012 to 2017 Braemar (alt. 339m) was, on average, 2.13ºC cooler than Leuchars (alt. 10m), close to what would be expected (i.e. 2.19ºC) if the temperature decreases by 1.0ºC for every increase of 150m in altitude.

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Turkish delight

Colin & Angela Scrutton

Angela's brother and his wife moved permanently to Turkey in 2001 after falling for the delights of Kalkan, on the south-west Mediterranean coast of Anatolia on previous visits. We first visited them in 2003 and were similarly impressed, so much so that we celebrated Angela's 65 birthday there with our son and daughter, Angela's brother and his wife, plus various of their Turkish friends. The following year, our son bought a property in Kalkan so we had a permanent base there.

We had already started to look at the orchids flowering in the Kalkan area and over the next few years we expanded our searches over that corner of Anatolia, ancient Lycia, which thrived from around 5000BC until overrun by Arabs in the 7th century AD (map Fig.1). It is now part of the modern province of Antalya. Turkey has a large orchid flora, unfortunately prone to depredations by herds of grazing goats and the digging up of orchid roots for salep. Kreutz describes 148 species and subspecies in his impressive memoir (Kreutz 1998). In this article, we record and illustrate the majority of a more modest selection of orchids that can be found within a day's drive of Kalkan. The main orchid season runs from February through to June with peak flowering in late March until early May. In general, we have followed the classification set out in the recent field guide of Kühn *et al.* (2019). The map (Fig.1) only shows the roads mentioned in the text, but there is a quite dense network of connecting routes between them, which can be followed on the maps recommended at the end of this article.

Fig.1: Map of the area around Kalkan.

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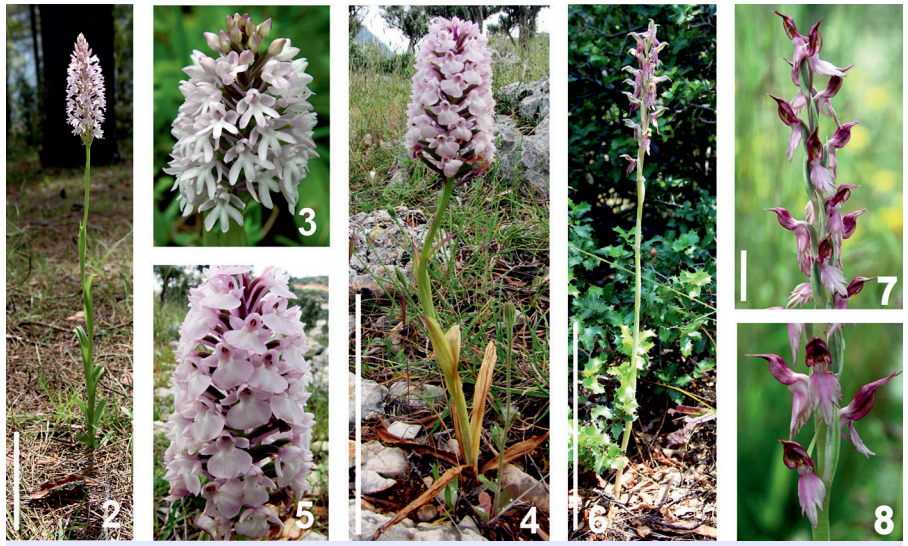
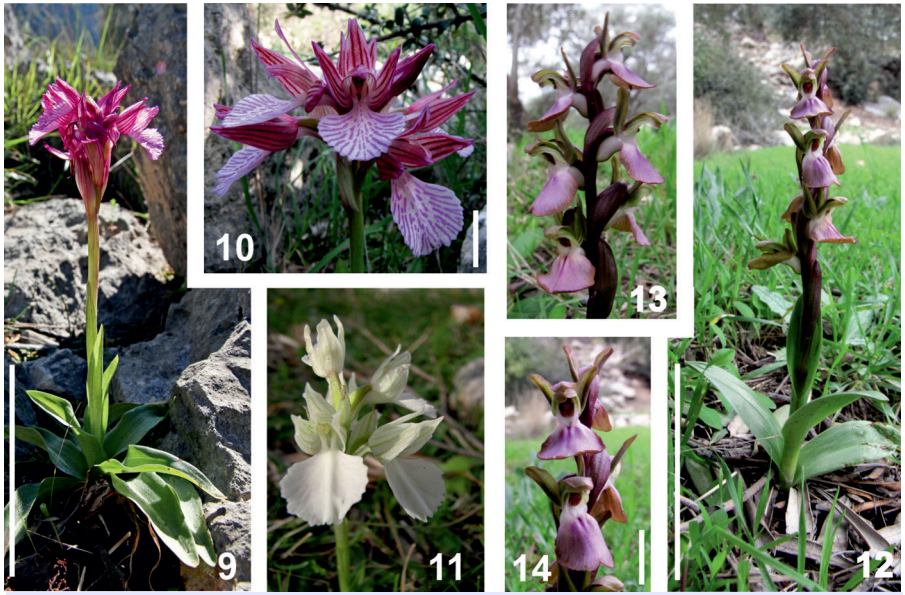


Figs. 2-3: *Anacamptis pyramidalis* (Kalkan). Figs. 4-5: *Anacamptis pyramidalis* var. *emarginata* (Kalkan); Figs. 6-8: *Anacamptis sancta* (Boğaziçi).
All plant scales 10 cm. All flower close-up scales, where shown, 1 cm.
All photographs in this article by Colin Scrutton.

Within Kalkan itself, open fields to the east of the centre, accessed by Zambak Sokak, have several species, including *Anacamptis pyrimidalis*, plus var. *emarginata*, *Anacamptis papilionacea*, *Anacamptis sancta, Ophrys lutea* subsp. *galilaea, Orchis anatolica* and *Serapias bergonii*. There has been recent building on this site and we are not certain how much open land has survived. *A. pyramidalis* is widespread across Turkey and in this area the species, and its much more restricted variant, almost always have white or faintly pink flowers. *A. papilionacea* is common across eastern Turkey, mainly *A. papilionacea* var. *heroica*. A pure white form was photographed at Ulugol.

Just west of Kalkan, on the relatively new road (D400) that by-passes Yeşilköy, a pull-in just past the crest gives access to the Lycian Way. This section, ending just beyond the Delikkemer (Roman aqueduct), 200m or so before the road to Pinakürü, is rich in orchids. *O. anatolica* is particularly common, together with *Neotinea maculata, Ophrys ferrum-equinum* and *A. papilionacea. Op. ferrum-equinum* is also abundant on the western grassy banks of the Pinakürü road opposite the footpath

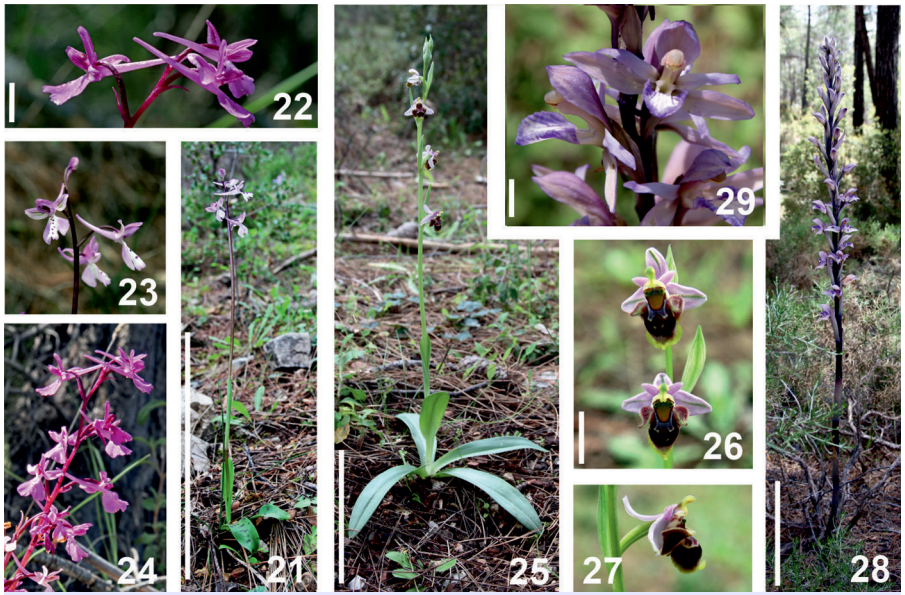


Figs. 9-11: *Anacamptis papilionacea* (Figs 9-10: Kalkan; Fig. 11: Ulugol).
Figs. 12-14: *Anacamptis collina* (Yalibüren).

Figs. 15-17: *Ophrys ferrum-equinum* (Figs. 15 & 17: Pinakürü road opposite Lycian Way, Fig.16: Lycian Way).
Figs. 18-20: *Neotinea maculata* (Figs. 18 & 20: Minare, Fig. 19: Lycian Way).

sign to the Delikkemer. Pinakürü itself and nearby Yalibüren are the best places to see *Anacamptis collina*, an early flowerer in late February to early March. Roadsides and open ground in the east of Yeşilköy itself yield *A. papilionacea, A. sancta, Op. ferrum-equinum, Op. fuciflora* subsp. *fuciflora, Limodorum abortivum, O. anatolica, Orchis italica*, and the rare *Ophrys argolica* subsp. *lucis.*

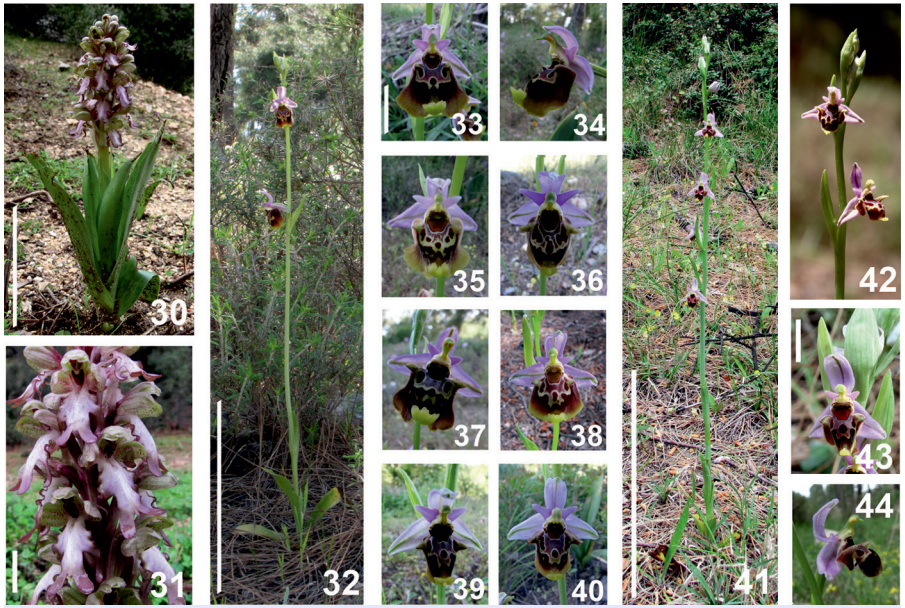
From the main road by-passing Yeşilköy on to the north and east, the D400, take the turning to Boğaziçi. In lightly forested ground on the south side of the road just before the village, *Himantoglossum robertianum, A. sancta, L. abortivum, N. maculata, Op. fuciflora* subsp. *fuciflora, Ophrys umbilicata* subsp. *lapethica, Ophrys scolopax* subsp. *scolopax,* and *O. anatolica* may be found. However, from several visits, we should note that the quality and diversity of orchids at this locality seems to vary markedly from year to year.



Figs. 21-24: *Orchis anatolica* (Figs. 21 &23: Boğaziçi, Figs. 22 & 24: Akyazi).
Figs. 25-27: *Ophrys umbilicata subsp. lapethica* (Boğaziçi).
Figs. 28-29: *Limodorum abortivum* (Fig. 28: Çamliova, Fig. 29: Gökçeören).

Returning to the main road, continue north to take the turning to Minare. After 2km, at a crossroads, take the left-hand turn towards Yakabağ and immediately after crossing the canal, look in the woods to the left (south-east). Here you can find *Anacamptis coriophora* subsp. *fragrans, A. pyramidalis, Op. fuciflora* subsp. *fuciflora, Op. argolica* subsp. *lucis, Op. ferrum-equinum, Ophrys fusca* subsp. *cinereophila, Ophrys fusca* subsp. *iricolor, Ophrys omegaifera* subsp. *omegaifera,*

Op. lutea subsp. *galilaea, Ophrys speculum, Op. umbilicata, L. abortivum,* and *H. robertianum.* On one trip, we came across a cluster of *Op. fuciflora* subsp. *fuciflora* in around 2m^2 showing the considerable variation in this subspecies (Figs. 33-40). You can walk along the canal to the east to Minare, with scattered orchids along the track. Alternatively return to the main Minare road where just before the entrance to the village *A. papilionacea, O. italica,* and *S. bergonii* can be found. A rough, twisting track off to the south of the village will take you to the magnificent ruins of Pinara, one of the ancient Lycian cities, with elaborate rock-cut tombs for high-ranking Lycians and simple rectangular slots in the high cliff to the north for the less exalted citizens. Across the valley is a fine example of a Roman amphitheatre. Lycia became a Roman province in AD46.



Figs. 30-31: *Himantoglossum robertianum (*Boğaziçi).
Figs. 32-40: *Ophrys fuciflora* subsp. *fuciflora* (Minare).
Figs.41-44: *Ophrys scolopax* subsp. *scolopax* (Fig.41: Ikizce, Fig. 42: Çamlıova, Fig. 43: Boğaziçi, Fig. 44: Akyazi).

Back in Kalkan, the 07-53 road climbs up the hill behind the town. Soon after crossing the D400 at traffic lights, there is a steep, very tight right-hand bend and shortly after, the road starts to level out. At that point, take a sharp left-hand turn onto a minor road to Üzümlü. At several points along this road, the grassy margins yield orchids, *Op. fuciflora* subsp. *fuciflora* and *Op. scolopax* subsp. *scolopax* near Üzümlü itself. Just north of Çaykőy, *Op. speculum, Op. lutea* subsp. *galilaea* and *A. papilionacea* can be found and south of Çavdır, *Op. ferrum-equinum*.

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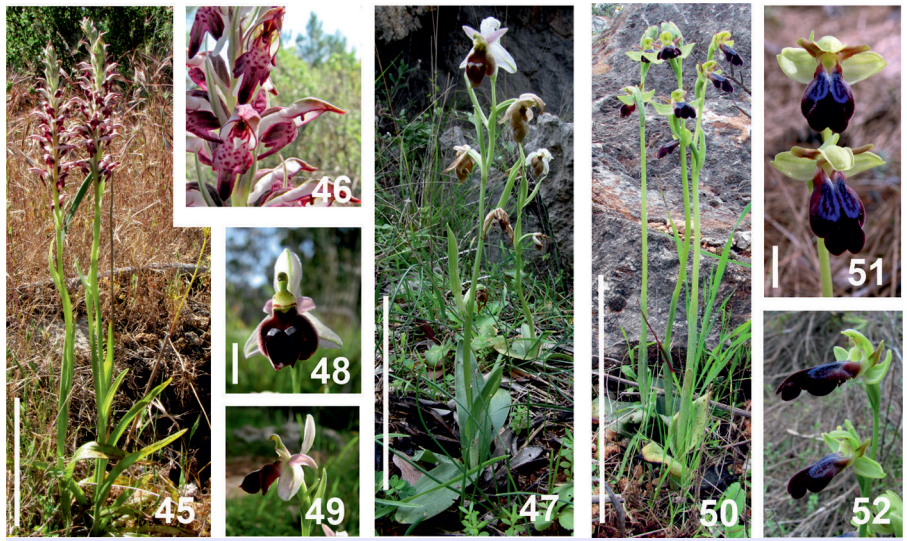
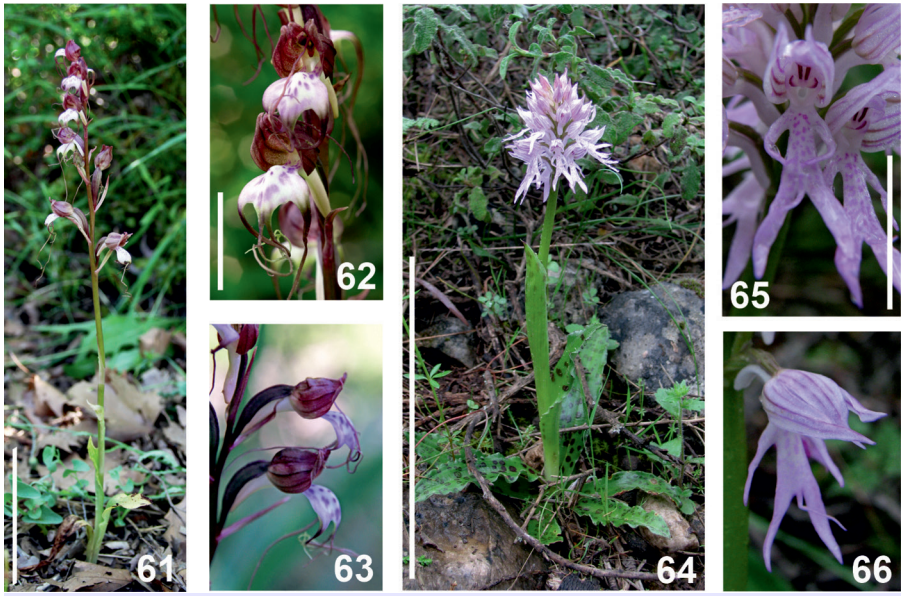


Figs. 45-46: *Anacamptis coriophora* subsp. *fragrans* (Minare).
Figs. 47-49: *Ophrys argolica* subsp. *lucis* (Ulugol). Figs. 50-52: *Ophrys fusca* subsp. *iricolor* (Minare).

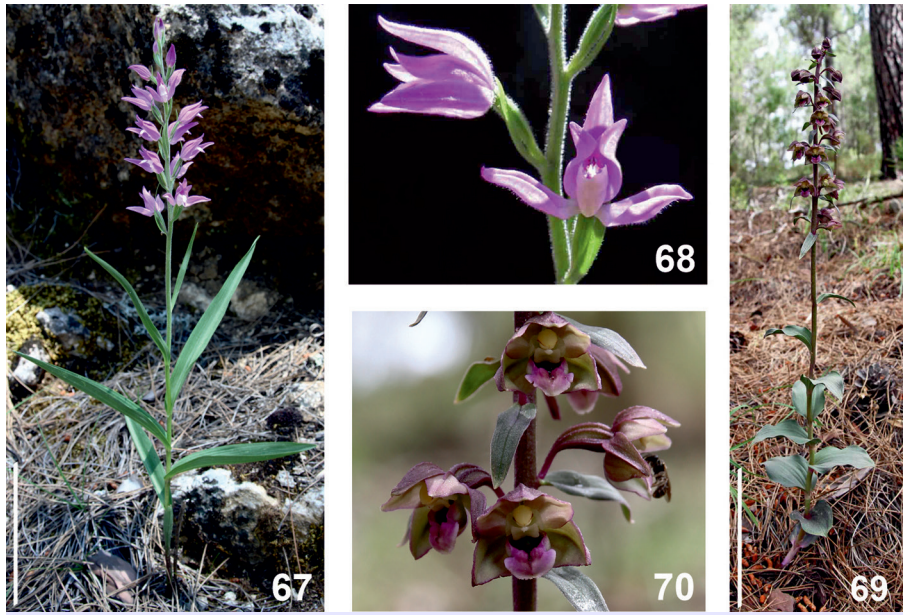
Figs. 53-54: *Ophrys lutea* subsp. *galilaea* (Minare).
Figs. 55-57: *Ophrys reinholdii*, (Gőkçeőren).
Figs. 58-60: *Ophrys speculum* (Fig. 58, Minare, Fig.59: Uğrar, Fig. 60: North of Çaykoy).

Returning to the 07-53, a short way past the junction mentioned above, the road climbs again with good views down over Kalkan and the coast. It then turns inland, past the Kapitaş Gorge, left at a T junction, and through splendid mountain scenery towards Akyazı and Çamlıova. A side road leads to İslamlar, which can also be reached from Kalkan via the Üzümlü road. Woods above the village have *Cephalanthera epipactoides* and *Ophrys reinholdii.* Back on the main road, *O. anatolica, Anacamptis laxiflora, A. coriophora* subsp. *fragrans, Op. fuciflora* subsp. *fuciflora, Op. scolopax* subsp. *scolopax, C. epipactoides* and *Cephalanthera kurdica* occur scattered in roadside woods just beyond Ikizce. The road ahead climbs to a col where *O. anatolica* can be found, then descends into the valley of the Dargaz Çay. Where the road straightens out on the valley floor, look for a concrete causeway across the river. Be warned that this might be flooded after heavy rain. Cross the causeway, turn left and drive through the village of Çamliova. Thereafter, in fields and woods on both sides of the track can be found *A. pyramidalis, A. coriophora* subsp. *fragrans, C. epipactoides, C. kurdica, Cephalanthera rubra, Epipactis helleborine, L. abortivum,* and *Op. scolopax* subsp. *scolopax.* Alternatively, if you turn right after crossing the causeway, abundant *C. rubra* and *E. helleborine* can be found in light woodland on the left-hand side of the road. This is the best place to see *C. rubra*.



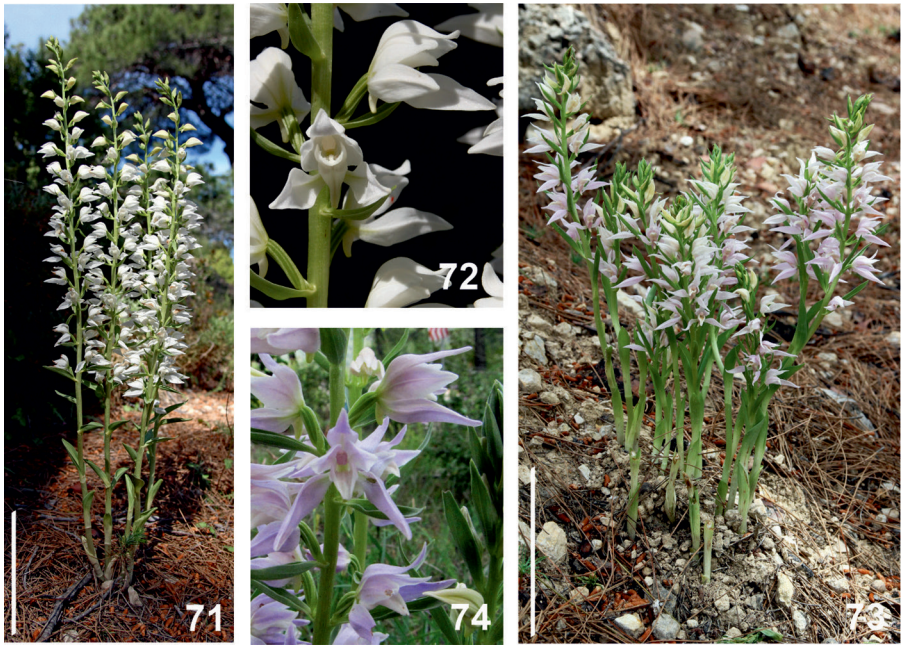
Figs. 61-63: *Himantoglossum comperianum* (East of Sarıbelen).
Figs. 64-66: *Orchis italica* (Minare).

Returning to the T junction mentioned above, a minor road to the east runs through Sarıbelen and on to Amavutlar, whilst a turning to the south just before Sarıbelen goes through Gőkçeőren and on to join the ring road around Kaş. 1km further east from Sarıbelen, on the south side of the Amavutlar road, is the only place we found *Himantoglossum comperianum* in this area. Initially we found only leaves, next to a discarded car tyre, and on a later visit a decapitated spike with one flower. The goats had been through! It became known to us as the tyre orchid. We constructed a pyramid of loose branches over the site and the following year we were rewarded by a mature and undamaged, if rather straggly, spike (Figs. 61-63)! On our last visit, the tyre had disappeared, presumably onto a wheel of one of the ubiquitous Renault 12s favoured by the local farmers, which you will find meandering unpredictably along the rural roads. There was no sign of our pyramid and again the flower had been destroyed by goats. Further on, around Amavutlar were a few spikes of *L. abortivum* and *O. anatolica*. Return to the road to Gőkçeőren, where in trees just beyond and above the village were several spikes of *C. epipactoides*, *L. abortivum, O. anatolica* and further on, on the eastern flank of an open area, *Op. reinholdii*.

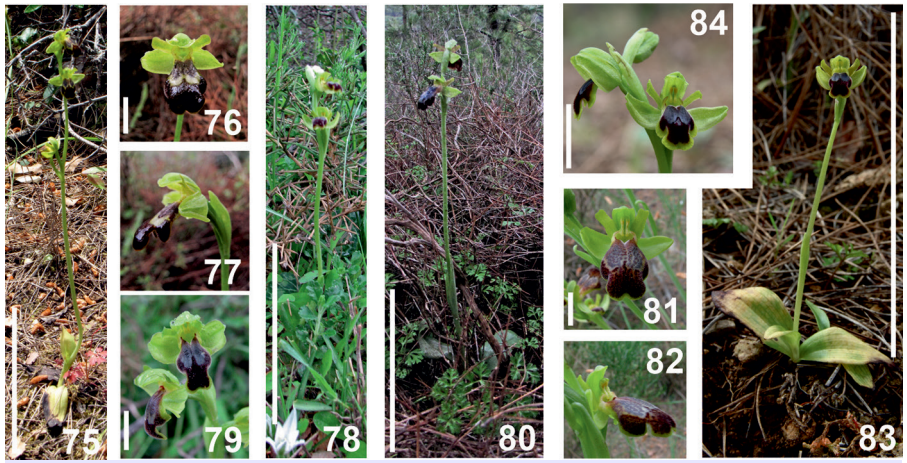


Figs. 67-68: *Cephalanthera rubra* (Çamlıova).
Figs. 69-70: *Epipactis helleborine*, (Çamlıova).

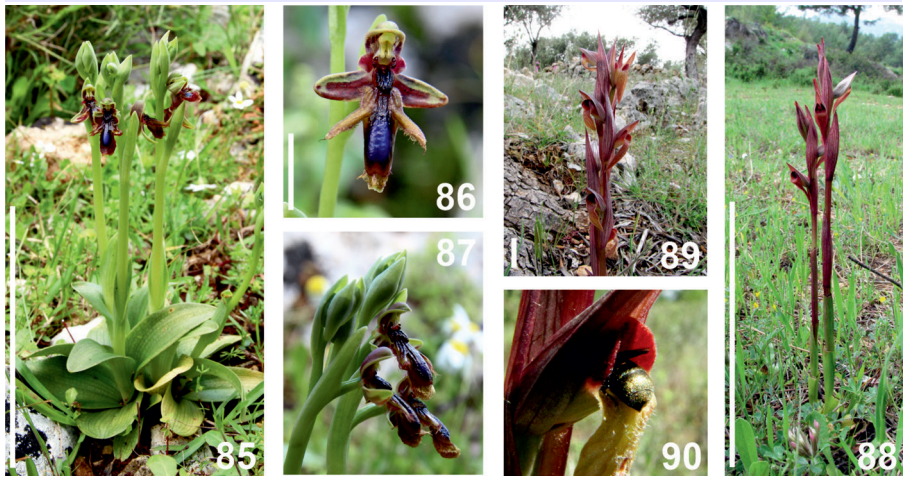
Back in Kalkan, take the D400 east, which is the main road to Kaş, running along the coast. On the outskirts of Kalkan, at a sharp left-hand bend, a track leads down to the village of Ulugol (alternatively Ulugul). There are a few houses in a partly cultivated area of roughly level ground stretching down to the coast opposite to Pinakürü. *Op. lutea* subsp. *galilaea* and *A. papilionacea* are common here, together with *A. pyramidalis* and *Op. argolica* subsp. *lucis.* There was also a rather rare version of the latter in which the labellum had a shiny brown surface and lacked a speculum. Back on the D400, the twisty road hugs the coast with excellent views. It passes the entrance to the impressive Kapitaş gorge, mentioned previously, and further on some offshore islands and eventually the Çukurbağ peninsula at Kaş. The town is worth a visit, but for the orchids, take the by-pass road up the hill behind the town. Again there are spectacular coastal views and towards the top, a side road to the south-east near Ağıllı (alternatively Ağullu) has *C. kurdica, Op. fuciflora* subsp. *fuciflora, Op. ferrum-equinum* and *Op. scolopax* subsp. *scolopax* in rough grassland on either side.



Figs. 71-72: *Cephalanthera epipactoides* (East of Sarıbelen).
Figs. 73-74: *Cephalanthera kurdica* (Fig.73: Pınarbaşı, Fig.74: Kaplankaya Hill).



Figs. 75-77: *Ophrys omegaifera* subsp. *omegaifera (*Minare).
Figs. 78-79: *Ophrys fusca* subsp. *blitopertha* (Minare).
Figs. 80-82: *Ophrys fusca fusca* (Fig. 80: Minare, Figs. 81-82: Akyazı).
Figs. 83-84: *Ophrys fusca* subsp. *cinereophila*. (Fig. 83: Minare, Fig. 84: Uğrar).



Figs. 85-87: *Ophrys regis-ferdinandii* (Çevreli-Üçağız roadside).
Figs. 88-90: *Serapias bergonii* (Fig. 88: Minare, Figs. 89 & 90: Kalkan, Fig.90: shows a bee sheltering in the flower).

Return to the main road and continue up to the top of the hill where there is a roundabout. Turn left on a minor road to Pınarbaşı where there are fine examples of *C. kurdica* plus *E. helleborine*. Return to the roundabout and turn left down Kaplankaya Hill. At a tight double bend, *C. epipactoides, C. kurdica,* and *Op. lutea* subsp. *galilaea* can be seen. At the bottom of the hill take the turning to Uğrar. Before reaching the village, a hill to the east with scattered trees has a rich but rather dispersed orchid flora including *C. epipactoides, Op. scolopax* subsp. *scolopax, Op. fuciflora* subsp. *fuciflora, S. bergonii, A. pyramidalis, Op. fusca* subsp. *fusca, Op. fusca* subsp. *cinereophila, Op. fusca* subsp. *iricolor, Op. lutea* subsp. *galilaea, Op. omegaifera* subsp. *omegaifera, Op. omegaifera* subsp. *israelitica* and *Op. speculum.* Turning north-east towards Kasaba, *S. bergonii, Anacamptis morio* subsp. *syriaca, A. coriophora* subsp. *fragrans, Op. fuciflora* subsp. *fuciflora, Op. scolopax* subsp. *scolopax,* and *Op. fusca* subsp. *fusca* can be found on open ground just before the village.

Back at the roundabout, take the main D400 east for 3.5km to a turning south to Kılıçlı. At the village, turn left (east) to Çevreli. At the top of a hill south of the village on the right-hand side of the road, and further on, on the left-hand side of the road to Üçağiz, are the best places to find *Ophrys regis-ferdinandii* among other orchids including *Op. speculum*, *Op. argolica* subsp. *lucis* and *Op. fusca* subsp. *fusca*.

This is a selection of good productive sites in the area around Kalkan. However, in addition, many of the roadsides around the area are worth exploring for scattered orchids. Areas where herds of goats are, or have been recently active (it is usually easy to tell), are best avoided. However, cemeteries are often worth exploring as goats are not allowed to enter. Digging for orchid roots for salep was not particularly common around the Kalkan area in our experience.

A useful map of the area for navigation is available locally in Kalkan (*A Map of Ancient Lycia*, scale 1:250000; available from Cemal Tor's shop Desti Gifts, in Süleyman Yılmaz Cd, down towards the harbour). It shows all the roads and most of the place names mentioned in this account. It also has useful information on the back on the history of the area and for touring historical sites. A group of three maps covering Lycia at various scales from 1:54000 to 1:75000 published by EWP Publications (ewp@ewpnet.com/maps.htm) show much more detail and include all the place names mentioned here. Again, they can be found in Kalkan (from Cemal Tor's shop Desti Gifts mentioned above) and there is useful tourist information on the back of each sheet.

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HOS Seed Bank 2021

Would any members who have any excess seed from this year please consider donating it to the seed bank. The seed of winter-green species would be particularly welcome. Donations to John Haggar, 16 Cross Street, Hove, East Sussex. BN3 1AJ. Many thanks in anticipation!

The Other Ghost: *Epipogium roseum* (D. Don) Lindl.

John Grimshaw

Having spent much time in my youth vainly seeking *Epipogium aphyllum* in Chiltern beechwoods I've read recent articles in *JHOS* with interest. Rainar Kurbel's account of Estonian ghosts (Kurbel, 2021) was fascinating, but I would like to caution against the publication of "var. *rosea*" (correctly *roseum*, to agree with the neuter genus) for the darker specimens he mentions and illustrates. The simple reason is that there is already an *Epipogium roseum* and undesirable confusion might result, a situation proscribed by the International Code of Nomenclature for Algae, Fungi and Plants (Shenzen Code, 2017) https://www.iapt-taxon.org/nomen/pages/main/art_53.html

My only encounter with this unfamiliar species was while undertaking a vegetation survey of the northern slope of Mt Kilimanjaro, Tanzania, on 5th June 1992. At about 2000 m I was deep into a particularly unpleasant patch of *Piper capense* – imagine a Japanese Knotweed (*Reynoutria japonica*) with persistent woody stems, dark green leaves and a distinct peppery scent when cut or bruised and requiring a machete to penetrate. This thuggish plant dominates large tracts of the Kilimanjaro forest between 1900-2300 m, especially where previous logging has opened the canopy, suppressing regeneration and creating a dark, humid understorey. In this thicket I came across a fallen tree, and in the decaying wood of a limb still held well above the ground (but under the *Piper*) were a number of spikes of an obviously mycoheterotrophic achlorophyllous orchid. They were 15-20 cm high, with down-curved spikes of small white flowers on fleshy stems. On investigation these arose from potato-like tubers with no sign of roots, pulling easily from the rotten wood substrate.

I collected a couple and very quickly found from *Flora of Tropical East Africa* (Cribb 1984) that they were *E. roseum*. The species had never been recorded in Tanzania, although it has a wide distribution in tropical Africa from the Gulf of Guinea to Malawi, with one record each from the neighbouring countries of Uganda and Kenya. Unfortunately I neglected to acquire a CITES permit for my specimens so they were rejected by Kew when I donated a set of my collections, and so far as I know this record for Tanzania has never been previously documented. I never saw it again, and have no photographs.

E. roseum has an extraordinary distribution through the Old World, from West Africa through Asia to Australia and the Solomon Islands, apparently occurring wherever conditions are suitable. There is an interesting account of it on the Australian Tropical Rainforest Orchids website https://www.anbg.gov.au/cpbr/cd-keys/RFKOrchids/key/rfkorchids/Media/Html/Epipogium_roseum.htm which describes how it grows in small groups on rotting wood at a certain stage of decay, just as I found it. They also say that it flowers very quickly following rain and dies down equally fast, so the window for seeing it must be very brief, as is the case with *E. aphyllum*. Another interesting online source, a 2011 blog post by 'Botany Boy' http://botanyboy.org/southern-japans-ghost-orchid-epipogium-roseum/ describes how it grows in compost heaps in Japan, but is also erratic in appearance there.

Roseum as an epithet is rather misleading as it has (almost always) entirely white flowers, with a few pink or purple spots on the lip (the flower, unlike that of *E. aphyllum*, is resupinate), though Cribb (1984) does say they can be 'dirty pink'. An average *E. aphyllum* has more colour!

My 'set' of both ghost orchids was completed in the Altai mountains of Siberia while on an Alpine Garden Society tour in July-August 1997. We had endured a long slow trundle in an uncomfortable vehicle to get into the mountains, and on arrival at the campsite members of the party disappeared into the surrounding forest for privy purposes. On emerging, one member of the party came up to me with something clutched in his hand and the question 'What's this?' on his lips. It was indeed *E. aphyllum* and investigation revealed that it was abundant on the forest floor, much to everyone's delight. When we returned to that campsite two weeks later, on 11th August, the plants had collapsed and shed their seed.

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Kurbel, R.T. (2021). Some remarkable observations of the Ghost Orchid (*Epipogium aphyllum*) in Estonia. *Journal of the Hardy Orchid Society* 18: 80-92.

Epipogium roseum (D. Don) Lindl. in forests of Thailand.

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