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The Hardy Orchid Society Committee

Cover Photograph: The hybrid between Lady Orchid and Monkey Orchid (*O.* ×*angusticruris*) growing in the open at Hartslock. See articles from page 77.
Photo by Keith Boseley

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Password for Members' Area of HOS Website: lady24

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

An issue with a variety of article subjects this time. The HOS programme of field trips continues to grow and the first few of a series of reports are included here. The inclusion of a talk during the Hartslock trip was a great idea and has stimulated a couple of update articles on the 'Lonkey' orchids as well as the site's history. It is a good while since they were featured in *JHOS,* contributing the cover photograph way back in July 2006! Also good to have something from Ben Jacob whose recent book '*The Orchid Outlaw*' will be familiar to many.

Please remember that *JHOS* is totally dependent on articles contributed by members. Smaller articles of one to four pages are especially helpful in filling space, so as to close an issue, and currently they are rather thin on the ground!

Chair's Note
Celia Wright

The weather this spring and early summer has been unpredictable with many rainy days. This has led to some late flowering dates for our native orchids but has not disrupted our Field Trips unduly. Richard Kulczycki and Charlie Philpotts have worked hard to give us an excellent and widespread programme. Sadly, I missed out on these this year for family reasons, but the positive reports I've read make me even more determined to join some next season.

I've compensated by reading more posts on the Forum, a feature of HOS much appreciated by our members. It allows members to share experiences as well as ask for help as they travel far and wide in search of rare UK orchids. They often including some fascinating photos that allow the rest of us to see flowers we may never see in the field.

It's good that members help each other with information in this way, but HOS needs other help to move forward as a thriving organisation. Several of our Officers and committee members have been in post for several years, some (including myself) filling more than one role, but not wanting to continue in this way. It also helps to keep an organisation vibrant if the committee changes. Could you help HOS by taking on a committee role? If so, please speak to me (currently both Chairman and Speakers Secretary) or to Simon (Vice Chair), Mike (who manages both this Journal and our website) or to Moira who has done an excellent job as Publicity Officer but cannot continue with that on top of her busy Membership Secretary role. If you regularly attend our meetings, Steve wants to hand on the role of projectionist – could you help him?

The other change we must tackle soon is the ageing nature of our sound system. For the Kidlington meeting this Autumn, we will probably hire a company to supply the equipment we need and personnel to manage it. This is a relatively expensive way to move forward, so if you are a member experienced in this field and prepared to get involved in the purchase of a new system and manage it at future Kidlington meetings (Leeds has its own system), please get in touch with me or Steve.

In my Spring Chairman's Note, I wrote about the replacement of the Malvern Orchid Show with one at Gardeners World Live at the NEC. This required a lot of planning but was well worthwhile and I hope will have attracted more new members. I will be talking about our experience there at the Leeds meeting – do come and hear all about it. Finally, do let me know if there are any other activities you would like HOS to consider. This is your Society – do get involved.

HOS Hartslock Field Trip 11th May 2024
Keith Boseley

The HOS members met at Goring station and were offered the choice of going directly to Hartslock Hill reserve or going with Denise Harper and Hamza Nobes to view the nearby exceptional colony of White Helleborines before then walking a mile down Gatehampton lane on to Hartslock Hill.

HOS members on Hartslock Hill listening to Professor R Bateman
Photo by Keith Boseley

The BBOWT Hartslock reserve has magnificent views overlooking the River Thames between Pangbourne and Goring and is well worth a visit especially on a glorious sunny day which we were fortunate to experience. You can well imagine the same summer day back in the 19th Century when the Victorian orchid collectors disembarked the train at Goring station armed with their picnics, rucksacks and trowels walking down the Gatehampton lane on to Hartslock Hill to collect the best specimens from the orchid slopes.

Hartslock reserve is one of the few remaining examples of what orchid populations possibly could have looked like in the Thames Valley before ploughing, herbicides and collecting decimated their numbers. Historically the area did not escape the plough. Excess machinery left over from the Americans at the end of WW2 allowed

O. ×*angusticruris* flowering in Hartslock Woods
Photo by Keith Boseley

the local farmer to plough the orchid fields resulting in no Monkey orchids flowering there in 1950. A story at Hartslock is that the locals were so upset by this they removed the ploughed orchids and replanted then further up the slope.

We know that Military Orchids were there at the turn of the 1800's not only because the Hartslock Monkey Orchids have *Orchis militaris* DNA in them but we have physical proof of a Military × Monkey hybrid specimen collected there (tubers as well) in 1831 by the Rev Leicester Darwell and presented to Kew in 1926. But he did not travel by rail there as the GWR railway was not opened until 1847. The herbarium sheet with this orchid, together with the two parent species, is illustrated in Richard Bateman's accompanying article (Fig. 4, page 87)

The Hartslock *Orchis simia* specimen is huge compared with the *O simia* found there today, much larger than the *O. militaris* specimen and slightly larger than their hybrid. Hartslock has suffered evolution in reverse where all the vigorous plants were removed and what we are left with is the Victorian collector's leftovers. Why the Victorians in the name of scientific study had to destroy so many rare, beautiful and valuable specimens is beyond me.

In 1996 Kew, as part of the Sainsbury Orchid Conservation Project, supplied ten *O. simia* plants raised from seed taken from Hartslock and they were planted at the top of the orchid slope. The orchid slopes are well looked after by the keen BBOWT volunteer team but the sudden appearance of two Lady orchids amongst the *O. simia* in 1998 created a cloud on the horizon. Hybrid orchids started to appear soon after and they were confirmed as *Orchis* ×*angusticruris* by Professor R Bateman in his 2006 paper (Bateman *et al*., 2008).

How the *Orchis purpurea* arrived at Hartslock is comparable to an Agatha Christie "who dunnit" novel. We know the Hartslock *O. purpurea* are not related to other Chiltern *O. purpurea* colonies but came from France. Windblown seed is an unlikely option which leaves intervention by man a possibility. Intentionally introducing *O. purpurea* by tuber or spreading seed in one of the last remaining *O. simia* colonies is really quite an unthinkable action. The big question is: are the *O. simia* at risk of being bred out by the hybrids? Thankfully the hybrid group has not shown much

sign of spreading over the last 24 years, except into the woods behind the slope. Also there are significant numbers of *O. simia* plants well away from the hybrids. The reason for the reluctance of the hybrid colony to expand could be explained by recent research on how the green leaved orchids support the leafless offspring protocorms via the mycelium network (Read *et al*., 2024).

John Haggar is conducting fertility tests on *O.* ×*angusticruris* seed collected from Hartslock in 2023 and we are repeating (under permit) tests in 2024. The first results suggest a low viability of *O.* ×*angusticruris.* In spite of having a large, densely packed flower inflorescence most spikes only have one matured seed capsule and some have none. Whether you think that the presence of *O.* ×*angusticruris* is a hazard to *O. simia* or you think that we are observing evolution as it would have happened naturally in the Chilterns, any orchid enthusiast would have to admit that *O.* ×*angusticruris* is a magnificent orchid.

A massive thank you to Richard Kulczycki for organising these field trips, Professor Richard Bateman for his analytical insight and John Haggar for his expertise.

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Bateman, R. M., Smith, R. J. & Fay, M. F. (2008). Morphometric and population-genetic analyses elucidate the origin, evolutionary significance and conservation implications of *Orchis* ×*angusticruris* (*O. purpurea* × *O. simia*), a hybrid orchid new to Britain. *Botanical Journal of the Linnean Society* 157: 687–711.

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HOS Photographic Competition 2024

Kidlington, November 17th 2024

Please note that the rule stating entries for any class must be photographed within the current or preceding calendar year has now been removed. Digital entries are to be emailed to Neil Evans, photocomp@hardyorchidsociety.org, or use a file transfer service for larger files, by the end of 18th October 2024. For print entries email Neil by the end of 18th October 2024 with the classes to be entered and a digital copy of the image. For entrants who are unable to attend the meeting Neil will accept postal entries and will take them to the meeting for you. Enclose a SAE if return of the prints is required. See inside cover of the Journal for Neil's postal address. Please name your files in the following format: Your Full Name, Class, Name of Orchid, Location. The Schedule of Classes and Rules are found on the HOS website: https://hardyorchidsociety.org.uk/photocomp.html.

The Hartslock *Orchis* Swarm: a Case-study in Forensic Orchidology

Richard Bateman

Few, if any, British native orchid sites are as well-known and frequently visited as the Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust's reserve at Hartslock, near Goring in Oxfordshire. Although this steeply sloping chalk grassland reserve offers stunning views of the Thames Valley, the main attraction for most of us has been the ongoing presence of one of Britain's only two persistent native populations of the Monkey Orchid, *Orchis simia* (Fig. 1A). This population famously has a long and chequered history, having flirted with extirpation in the mid-20th century before being dragged back from the brink as a result of having been made a pioneering case-study in hand-pollination (Table 1).

Date	No. Monkey Orchids	Significant events
1800s (early)	Many thousands	
ca 1840		Extensive ploughing
Late 1800s	Few thousand	
Late 1800s–early 1900s		Extensive botanical collecting
1920s–30s	100–200	
1949–50		Most of site ploughed
1951	0	
1952–53	1	
1959	9	
1960–65	1–5	
1968–77	*ca* 8	
1977		Hand-pollination began
1980s	*ca* 20	
1995	72	
1996		10 Kew-bred plants introduced
1998		First flowering of 2 Lady orchids
1999	100	
2000s	*ca* 150	
2006		7 Lady x Monkey hybrids appear
2023	*ca* 400?	Several hundred hybrids flower

Table 1: Approximate estimates of numbers of Monkey Orchids present at Hartslock through the last two centuries, compared with the dates of events likely to have impacted significantly on the population.

We were just becoming confident that the expanding Monkey population had a promising long-term future when in 1998 two plants of the Lady Orchid, *Orchis purpurea* (Fig. 1B), flowered in the midst of the Monkeys. Although questions were immediately raised regarding the uncertain origin of these presumed immigrants, much greater excitement ensued in 2006 when seven plants of the putative hybrid between the Lady and Monkey Orchids flowered at Hartslock (= *Orchis* ×*angusticruris*: Fig. 1C). However, what was an exciting development for native orchid enthusiasts also represented a monumental headache for the conservationists managing the site, as any further gene-flow with other anthropomorphic *Orchis* species would surely threaten the presumed genetic purity of the nationally important Monkey Orchid population. Since then, the perceived threat has intensified, the hybrid swarm having expanded spectacularly to encompass several hundred individuals.

Fig. 1: Flowers of the four taxa featured in this article: *Orchis simia* (A), *O.* ×*angusticruris* (B), *O. purpurea* (C), *O. militaris* (D). Photos by Richard Bateman.

Back in 2006, I wasted little time in organising a scientific visit to Hartslock, in order to conduct a detailed morphometric survey of the relevant orchids and, along with other Kew colleagues, to sample a few flowers for DNA analyses. Several questions needed to be addressed: Were the apparent hybrids genuinely the result of an unsanctioned liaison between a Monkey and a Lady? If so, who was 'mother', supplying the ova, and who was 'father', supplying the pollen? And what was the origin of the recently arrived Lady Orchid parent – could it at least confer legitimacy on its progeny by demonstrating its *bona fide* British credentials? Thus began a supposedly modest side-project that would soon draw into its orbit a third closely-related species, the Military Orchid (*Orchis militaris*: Fig. 1D), and would prove to be a most intricate and complex forensic challenge.

Hammers are, in practice, useful for cracking nuts!

In retrospect, my colleagues and I chose our analytical approaches wisely from among those available at the time. We had already accumulated a wide range of anthropomorphic *Orchis* samples gathered across Europe, but perhaps of greatest interest relative to Hartslock were comparative samples taken from the closest native populations of *O. purpurea* (4 km to the East), *O. militaris* (18 km to the Northeast) and *O. simia* (140 km to the East). We applied four different analytical approaches. Our morphometric study borrowed its 43 morphological characters from my previous studies of these species in the 1980s. The remaining three methods all employed DNA, exploring both the nuclear (i.e. chromosomal) DNA inherited equally from both parents and the plastid DNA inherited exclusively from the 'mother'. We used not only direct base-pair sequencing of my favourite nuclear 'barcode' region, ITS, but also applied DNA fragmentation techniques to both the nuclear genome (AFLPs) and the plastid genome (microsatellites). In an ideal world, all four analytical approaches would tell roughly the same story. But it actually took a great deal of thought for us to arrive at a story sufficiently complex to fit the accumulated data (Bateman *et al*. 2008).

Behaviour of character	Number of characters (%)
More extreme than *O. purpurea*	7 (18)
Similar to *O. purpurea*	14 (36)
Intermediate to both parents	8 (21)
Similar to *O. simia*	5 (13)
More extreme than *O. simia*	2 (5)
(Unclassified)	3 (8)

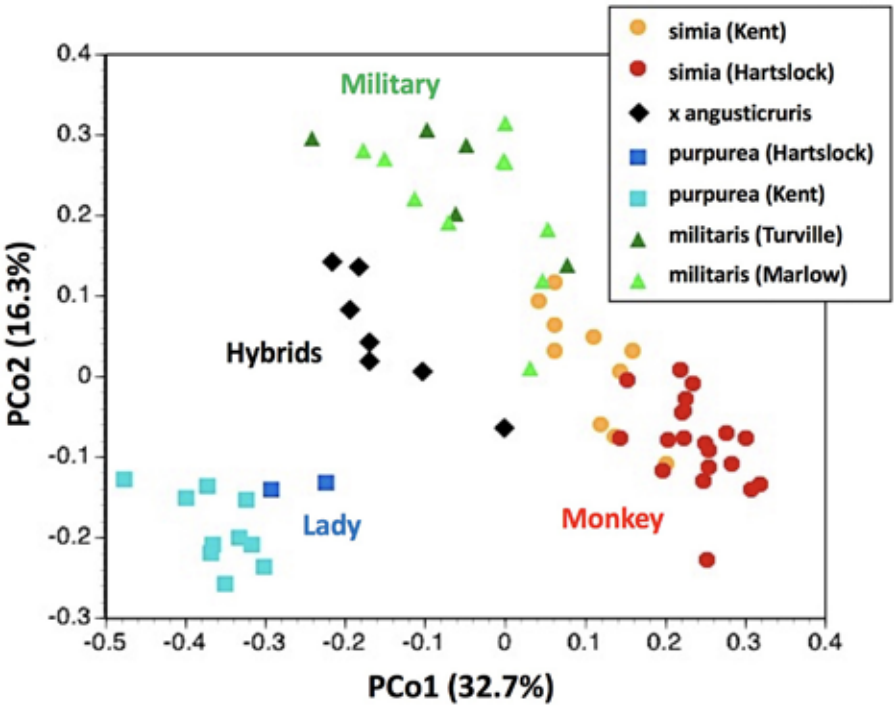
54%

21%

18%

Table 2: Comparison of the proportions of morphological characters in which the initial seven Hartslock hybrids are intermediate to their parents relative to those where they resemble, or are more extreme than, their parents. There is clear bias towards their Lady Orchid mother.

Morphometric results



Fig, 2: Morphometric ordination of 64 British plants of anthropomorphic *Orchis* species, including seven *O.* ×*angusticruris* from Hartslock. Modified after fig. 7B of Bateman *et al*. (2008).

Unsurprisingly given their respective appearances, our multivariate analysis of the morphological data showed *O. simia* and *O. purpurea* to be more distinct from each other than either is from *O. militaris* (Fig. 1). However, the hybrid plants were placed statistically midway between all three species (Fig. 2), having apparently developed some characteristics more typical of *O. militaris*. Conventional wisdom states that hybrids will be intermediate between their parents, but this is rarely true in practice. When the morphological characters were examined individually, it became clear that the hybrids resembled *O. purpurea* more closely than *O. simia* (Table 2). Such asymmetry occurs frequently in hybrid orchids, and tends to favour the mother (presumably indicating a degree of cytoplasmic inheritance not directly mediated by DNA). Thus, although morphological analysis both supported the hybrid identification and suggested the more likely mother, neither conclusion was considered definitive at this stage.

Plastid microsatellite results

So, we therefore move on to consider results for the Hartslock plants from plastid DNA, which is inherited exclusively from the mother. Of five microsatellite regions examined, two were identical for the two parents, but the remaining three all showed the hybrids to resemble *O. purpurea*, thus identifying with much greater confidence the Lady Orchid as their mother. However, when plastid comparison was expanded to include plants from other populations, both British and continental, a much more complex pattern emerged in which two main groups were evident, each of which contained representatives of all three species. Among the Goring plants, the Monkeys occurred within one group, but the Ladies and the hybrids occurred in the alternative group, again supporting the Lady Orchid as the mother of the hybrids. However, Lady Orchids from the supposedly pure population closest to Hartslock proved to have plastids like those of the Monkeys, showing that seed from this population could not have been the source of the Ladies that inexplicably appeared at Hartslock in 1998 (Table 1).

Nuclear AFLP results

AFLP analysis of the nuclear genome efficiently separated the three *Orchis* species, but also revealed two discrete clusters of populations of *O. purpurea*. The larger cluster contained plants from many populations, both British and continental, whereas the smaller cluster consisted only of plants from Southern France plus, significantly, the Hartslock Ladies. The hybrids were placed midway between this cluster and the Monkeys, suggesting that the most likely origin of the Hartslock Ladies was France. Also of interest was the greater genetic cohesion evident in the Military Orchid compared with the Lady and Monkey Orchids.

Nuclear ribosomal ITS results

The last body of DNA data to consider is sequences from my favourite 'barcode' region, ITS, which is also inherited from both parents. But this region provided the most complex picture of all the analyses conducted, revealing five genotypes that are denoted by roman numerals in Figure 3. *O. militaris* proved to be confined to genotype I, but both *O. simia* and *O. purpurea* yielded three of the five genotypes, including genotype I. For *O. purpurea*, most British and a few continental examples occurred in genotype II, whereas group III contained most of the continental Ladies plus, significantly, the Hartslock Ladies, adding further circumstantial evidence of their continental origin.

Surprisingly, although a minority of the Goring Monkeys shared genotype IV with their continental equivalents, most of them unexpectedly yielded genotype I, which is more typical of *O. militaris* (we will return to this observation a little later, under 'Taking stock'). Given that ITS is inherited from both parents, it was unsurprising that the hybrids yielded both genotype III, inherited from their mother, and genotype IV, inherited from their father. However, this result also thereby showed that their

father had the rarer of the two genotypes present in the Hartslock Monkey population, suggesting that the seven hybrids therefore probably shared the same father and were probably the result of a single cross-species pollination event.

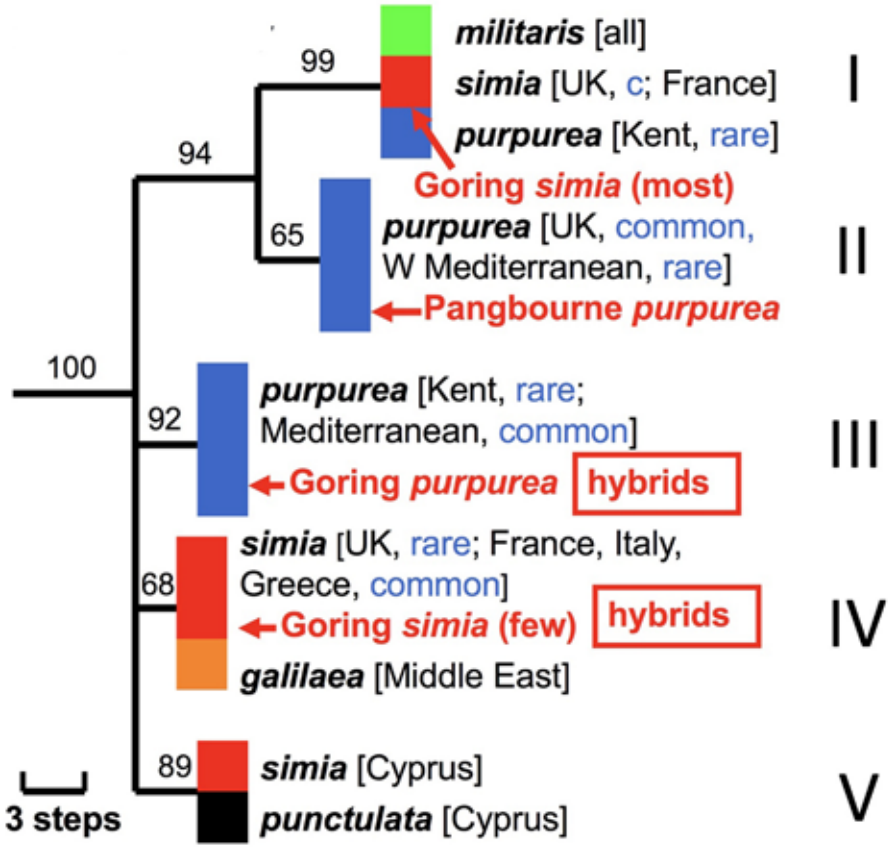


Fig. 3: The complex and perplexing distribution of anthropomorphic *Orchis* plants among five contrasting genotypes (I–V) of nuclear ribosomal ITS. Modified after Fig. 9 of Bateman *et al*. (2008).

Taking stock

Although the results of our various analyses initially appeared almost uninterpretable, it eventually became clear that there was a meaningful pattern, albeit a complex one. All four kinds of analysis were consistent with the prior assumption that the recently formed hybrids were the result of mixed mating between *O. simia* and *O. purpurea*, and all identified *O. purpurea* as their mother. So far, so good. However, the results of AFLP and ITS challenged the native status of the mother, who was likely to have originated in the western Mediterranean, leaving open the vexed question of how

the original Lady immigrated into Oxfordshire. In Table 3, I have summarised (and estimated the relative probabilities of) six explanations for the origin of the Ladies. I conclude that we need to consider seriously only two: recent airborne seed arriving from the continent or, more likely, deliberate introduction of seed. In the absence of a signed confession from some misguided orchid enthusiast, there remains no obvious way of distinguishing a natural from an artificial origin.

Hypothesis	Evidence
(1) Seed and/or tubers lay undetected for a century	Very unlikely – tubers and ?seeds rarely survive underground for more than two years
(2) Recent airborne seed from nearby in Chilterns	No – other Chilterns plants differ strongly genetically from those at Hartslock
(3) Recent airborne seed from UK HQ in Kent	Unlikely – most Kentish plants differ strongly genetically, and all differ to some degree
(4) Recent airborne seed from the continent	**Possible** – consistent with the foreign genetic profile, but requires extensive "rain" of seed and prior presence of the correct mycorrhizae
(5) Continental tubers were deliberately planted	Unlikely – hopefully, no true 'enthusiast' would behave so stupidly
(6) Continental seeds were deliberately sown	**Most likely** – consistent with the foreign genetic profile, and with the behaviour of some 'enthusiasts'

Table 3: Crude assessment of the relative probabilities of six hypotheses that could potentially explain the sudden appearance of Lady Orchids at Hartslock in 1998.

But before we consider taking any punitive actions against the questionable Ladies, we should first take a closer look at the supposedly unblemished Hartslock Monkeys. In particular, why do the Hartslock Monkeys (and also the native Ladies, located 4 km East of Hartslock) have plastids more typical of Military Orchids? And why do most of those Monkeys also possess nuclear ITS genotypes more typical of Military Orchids?

A low-tech explanation for high-tech observations

A likely answer to these questions emerged from a speculative visit that I paid to the Kew Herbarium, which contains many sheets bearing multiple specimens of anthropomorphic *Orchis* plants, most collected in the 19th or early 20th centuries. Many of these plants were collected in the Thames Valley and some sheets bear more

than one species of anthropomorphic *Orchis*. One such sheet that caught my eye, collected in 1831 and explicitly labelled "Hartslock Wood", bore three specimens: a plant of *O. simia* that is larger than any plant seen at Hartslock today, a shorter but robust plant of *O. militaris*, and – placed to the right of both – their hybrid (Fig. 4).

Fig. 4: A Kew herbarium sheet bearing three anthropomorphic *Orchis* plants collected from "Hartslock Wood" by L Darwell on May 23rd 1831, attributed to "*Ophrys tephrosanthes*" (an early superseded name that arguably encompassed multiple species). The three specimens are here re-identified as *Orchis simia* (left), *O. militaris* (centre) and their hybrid (right). Photo by Richard Bateman.

It thus became clear that at Hartslock, and in the surrounding area, *O. simia* and *O. militaris* co-existed and hybridised naturally during the 19th century, even though *O. militaris* no longer occurs in the immediate vicinity. Indeed, there is contemporary documentary evidence supporting the existence of hybrid swarms. According to 'English Botany' (Syme 1873, p. 96), "Towards Goring, *O. simia* and *O. militaris* grow together, and there intermediate forms connecting the two occur, which I believe to be of hybrid origin." Our data suggested that there was sufficient gene exchange for the Monkey Orchids to acquire some of the genetic characteristics of the Military Orchid. Thus, although today's Hartslock Monkeys may appear pure, our analyses have forced them to reveal their true genealogical history, which has been decidedly chequered. Where orchids are concerned, purity seems to be an unreasonable expectation.

Can French *Orchis* populations help to predict the future at Hartslock?

All of the above conclusions were formally published 16 years ago (Bateman *et al*. 2008). Since then, the main advances in understanding these orchids have arisen through Leif Bersweden's (2021) doctoral research. Bersweden *et al*. (2021) analysed for lip shape and six nuclear microsatellites several French populations that intermix two species of anthropomorphic *Orchis* species.

Interestingly, the hybrid combinations *O. purpurea* × *O. militaris* (Fig. 5A) and *O. purpurea* × *O. simia* (Fig. 5B) gave genetic results that differed from each other in potentially important ways. In the case of *O. purpurea* × *O. militaris*, the mixed population samples contained approximately 25% of pure individuals of each parent (blue and red columns, respectively, in Fig. 5A) and the remainder were a roughly equal mixture of primary (F1, green) and secondary (F2, orange) hybrids, though there was little evidence of hybrids backcrossing with either parent. In contrast, their study populations of *O. purpurea* × *O. simia* proved to be rich in F1 hybrids but lacked F2 hybrids (Fig. 5B). However, in this case, asymmetric back-crossing was detected, the F1 hybrids occasionally crossing with *O. simia* (pale pink columns) but not with the somewhat earlier flowering *O. purpurea*.

In this context, readers of *JHOS* may recall that John Haggar has described to us similar reproductive asymmetry that he has detected when artificially crossing *Dactylorhiza praetermissa* with *Dactylorhiza fuchsii* (Haggar & Malmgren 2012). Such studies show that partial barriers to reproduction can be of substantially different strengths even between closely related orchid species.

If we were to extrapolate results from the French populations onto the Hartslock population, we would assume that, despite the now huge size of the hybrid swarm, the hybrids are not able to reproduce with each other or to backcross with the Lady Orchid, whose genetic purity should therefore be assured. Of course, the reputation of

the Lady Orchids is not the primary concern of those of us interested in the long-term prospects for the much-prized population of Monkey Orchids, which is predicted to be somewhat vulnerable to introgression of Lady Orchid genes inherited via the F1 hybrids. However, the considerable diversity of forms now encompassed by the hybrid swarm raises suspicions that the British population may be less reproductively

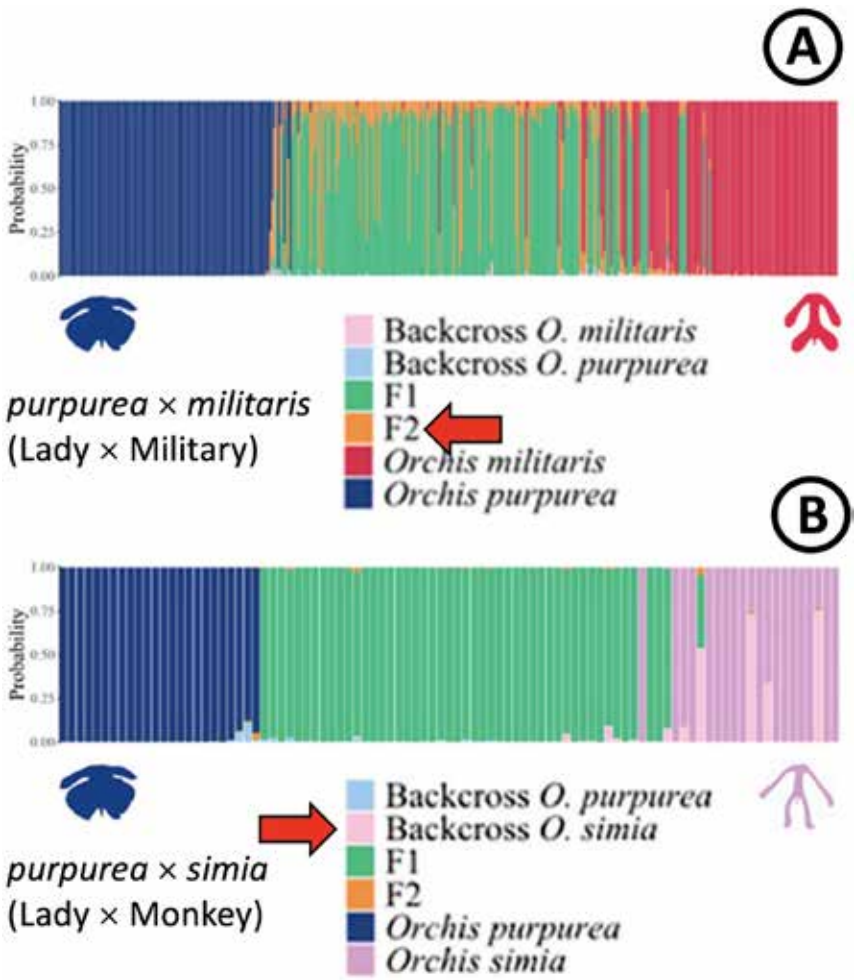


Fig. 5: Statistical assessment of the likely identities of anthropomorphic *Orchis* plants in populations that encompass two species. Each column represents an individual, and colours indicate their presumed identity based on Bayesian posterior probabilities. Note especially the presence of F2 hybrids in (A) and of back-crosses with *O. simia* in (B). Fig. 4D–E of Bersweden et al. (2021).

conservative than their French equivalents. It would be fascinating to resample the hybrid swarm today to allow morphometric and genetic comparison with the 2006 results. For the present, we await the results of John Haggar's current assessment of seed viability in the hybrid plants.

Do the orchids actually know best?

In theory, the Hartslock *Orchis* colony could be entering an extended period of hybridisation. Anthropomorphic *Orchis* species tend to attract each other, suggesting that they share not only a wide range of pollinators (mainly bees) but also similar mycorrhizal partners. Certainly, their subtle differences in flowering time and habitat preference are often insufficient to cause reproductive isolation.

However, the Hartslock orchids do not appear to be aware of the theory, and so have chosen to behave rather differently in practice. Although the hybrids have become numerically dominant, they seem reluctant to expand much beyond the area surrounding their Lady Orchid mother. It is especially interesting that, whereas the hybrids have flourished, the Hartslock Lady Orchids have not spread or indeed increased in numbers; none flowered in 2024. If, as seems likely, the Hartslock Ladies are soon extirpated, anyone unfamiliar with the history of Hartslock's orchids would likely be thoroughly confused by the presence of so many apparent hybrids in the absence of any obvious second parent. DNA analyses of the surviving plants would then be needed in order to demonstrate forensically the past genetic contributions of *O. purpurea*! Recent history suggests that it is actually the Monkey Orchids whose future appears most assured, as they are actively colonising new areas of downland in and around Hartslock. They appear to be seeking microhabitats less threatened by desiccation levels that are increasing progressively through climate change – a phenomenon that is also evident at our only other reliable native site for *O. simia*, in Kent (Bateman 2022).

It is, of course, too late to eradicate with confidence either the non-British Lady Orchids or their hybrid progeny; nature has regained control at Hartslock. I still believe that the decision taken in the mid-2000s not to intervene was the correct one. There is clear evidence, within plants that we all accept as morphologically acceptable Monkey Orchids, of considerable natural gene-flow with other anthropomorphic *Orchis* species at Hartslock in the past. The predominance of unusually small, pale-flowered Monkeys at Hartslock today, as compared with Victorian specimens, is likely to be largely the result of "elimination of the fittest" by rapacious Victorian botanists who preferentially removed the larger, more vigorous plants, seemingly happy to collect tubers as well as the above-ground parts of the orchids (Fig. 4). In short, over-collecting and habitat destruction have probably impacted more on the appearance and persistence of the surviving Monkeys than has incoming gene-flow from closely related *Orchis* species.

One final thought

At about the same time as we were studying the Hartslock *Orchis*, my Kew colleagues and I were also conducting a morphometric and genetic study of British populations of the nationally endangered Late Spider-orchid, *Ophrys fuciflora*. We sampled all ten remaining populations in East Kent, and in three of those populations we unsurprisingly encountered hybrids with the Bee Orchid, *Ophrys apifera* (Devey *et al*. 2009). More surprising to us were the high levels of both morphological and genetic diversity that we detected among the Spider-orchids, seemingly contradicting our initial hypothesis that they had arrived in Britain relatively recently. I now wonder whether it is possible that this genetic diversity at least partly reflects periodic gene-flow with other native species of *Ophrys*, all of which still occupy the same geographic areas as *O. fuciflora* and still occasionally hybridise with each other where geographic proximity permits (Stace *et al*. 2016).

In this case also, conservationists assisting our research in the mid-2000s raised the issue of whether the genetic purity of the nationally rare *O. fuciflora* could best be preserved by hunting down and removing suspected hybrids. For me, the answer to this question is even clearer for the *Ophrys* species in Kent than it is for the anthropomorphic *Orchis* species at Hartslock. All four of our native *Ophrys* species made their own way into Britain, and will likely have been exchanging genes in Kent for millennia. This is simply what closely related orchid species do as part of their innate nature. Given the wide distribution of *O. apifera* on chalk grassland, I consider it highly unlikely that any of those remaining populations of *O. fuciflora* are in fact pure, but it is important to realise that their perennial impurity is an entirely natural phenomenon. Rather, it would be the deliberate removal of putative hybrids, conducted in the questionable cause of a doubtful genetic purity, that would constitute an unnatural process – an action arguably comparable in gravity with the deliberate introduction of foreign Ladies into the archetypally British habitat at Hartslock.

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Cumbria Field Trip 14th July 2014
Charlie Philpotts

Twenty people in total joined the trip and met at a car park near Kirkby Stephen. Our first site was Waitby Greenriggs which is always interesting. The recent rain had obviously helped the orchids and *Epipactis palustris* in particular was in good shape with record numbers. Several white Fragrant-orchids were seen as well as a hybrid between Marsh Fragrant-orchid (*Gymnadenia densiflora*) and Common Spotted-orchid (*Dactylorhiza fuchsii*). This was the first time this hybrid had been recorded at Waitby Greenriggs. Second visit was to Ash Fell to look at the Lesser Twayblades. It was the first time some of the group had seen this species and we spent a good while exploring the site and taking photos. The third site was Augill Pasture which was past its best for orchids but still had a wide variety of other wildflowers.

Hybrid between Marsh Fragrant-orchid and Common Spotted-orchid

Photo by Keith Wartnaby

A collection for the Cumbria Wildlife Trust came to a very generous £150 which was gift aided to £180 online. It is a pleasure running these trips to see how much people enjoy the reserves and the collection goes back to aid the work done.

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Darwin and Devon's Orchids

Ben Jacob

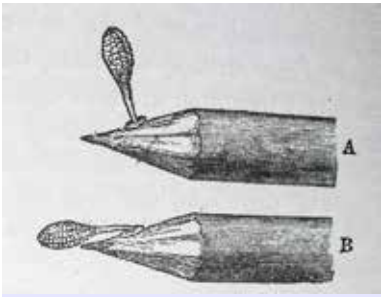
On 1st July 1861, Charles Darwin, his wife, Emma, seven of their children, some servants, and '3/4 of a tun of luggage' travelled by train from their home in Kent to Torquay, a seaside village on the south coast of Devon in Southwest England.[1] Ostensibly, the trip was to aid the convalescence of their daughter, Henrietta ('Etty') who had contracted typhus a year earlier and was yet to fully recover. At that time Torquay was a fishing village with a reputation as a fashionable health spa. Three weeks later, Darwin notes in a letter that 'Etty improves a little' and she was soon well enough to accompany Emma Darwin on a week-long tour of Dartmoor.[2] The Darwins' trip to Torquay was not, however, all about Etty's recuperation: that summer coincided with an intense period of research which Charles was conducting into the pollination mechanisms of orchids, in particular, many native British species.

The fruits of this research poured into his book, '*On the Various Contrivances by Which British and Foreign Orchids Are Fertilised by Insects, and the Good Effects of Intercrossing'*, published in May 1862 by John Murray. Containing exquisite woodcut illustrations by George Sowerby, it was the first book Darwin published after '*On the Origin of Species by Means of Natural Selection*' (1859). Although a much-expanded second edition was released in 1877, '*On the Various Contrivances*' has always been overshadowed by the earlier work. Nevertheless, Darwin's book on orchids transformed understanding of flower morphology, proved the existence of vector-modulated cross-pollination (which could only have developed if insects and flowers had co-evolved), and offered the most comprehensive study of orchids to date.

Despite these factors, Darwin's biographers say little about this period. Adrian Desmond and James Moore devote one page of their 850 plus page biography to Darwin's time in Devon and A. N. Wilson entirely omits reference to the summer in Torquay while offering only passing mention of Darwin's fascination with orchids.[3]

What ignited Darwin's enthusiasm for orchids is unclear. In '*On the Various Contrivances*' he claims, 'I have been in the habit for twenty years of watching Orchids'.[4] In a letter written in 1860 to readers of the '*Gardener's Chronicle*' he states he had been 'observing our orchids during many years', but his letters provide little support for these assertions.[5] He first mentions orchids in his correspondence once in 1856. In 1857 his letters refer to orchids twice. Then nothing for two years. In 1860 he refers to them on 38 occasions, in 1861 117 times, 215 in 1862, before occurrence of the word 'orchid' subsides: 120 in 1863, 54 in 1864, never returning to the same level of frequency.

Of course, letters cannot tell the whole story. His growing interest in orchids probably owed much to the Victorian fashion for imported exotic plants (by 1861 Darwin had amassed quite a collection of tropical orchid species),[6] or perhaps it was the arrival of spring and the blooming of native orchids near his Kent home which might have proven an irresistible distraction from hours spent boiling the flesh off the carcasses of rabbits, hens, and ducks in order to measure their skeletons.[7] Either or both of these factors could have combined with Darwin's irrepressible curiosity about the natural world, a trait which led him one day, seemingly on a whim, to insert the sharpened tip of a pencil into the flower of an Early-purple Orchid (*Orchis mascula*).



Woodcut illustrating pollinia of Early-purple Orchid from Darwin (1862)

Withdrawing the pencil, Darwin noticed two tiny yellow sticks ('projecting up like horns') attached to it.[8] Then, entirely of their own volition, those tiny 'horns' (the pollinia of the Early-purple Orchid which had evolved to attach to pollinating insects) bent forwards by 90 degrees. So began Darwin's research. He wondered why this movement of pollinia occurred and he subsequently discovered that, in adopting this manoeuvre, these 'horns' reached the optimum position to enable pollination. It was, Darwin thought, a 'beautiful contrivance'.[9] Exploring further, Darwin discovered that the Early-purple Orchid was not the only orchid to have developed a specialised pollination mechanism.

By the time he and his family reached Torquay, Darwin was enthusiastically engrossed in his research. At the time he confided in a letter to his close friend, Joseph Hooker, Director of the Royal Botanic Gardens at Kew, 'I am got profoundly interested in orchids'.[10] Six weeks later he explains, 'each species requires studying for days'.[11] To another correspondent he professes, 'I am doing nothing, except drawing up a long paper on the fertilisation of Orchids'.[12] These statements present a different picture from that portrayed by Desmond and Moore who describe how, while in Torquay, 'in the warm sun Charles spent hours on his hands and knees, watching insects visit wild orchids'.[13] Darwin's letters suggest he spent most of his time indoors experimenting, dissecting and writing. What's more, most of the orchids he examined were not located in the area; they arrived by post from around the country. Among them, Sir Charles Lyell, a geologist (and pioneer explorer of the effects of climate change) sent Darwin 49 Marsh Helleborine flower spikes; Bingham Malden, vicar of Sheldwich in Kent, sent boxes including Lizard, Military and Lady; and George Chichester Oxenden, second son of a baronet and author of satirical verse, supplied him with multiple orchids, including the Burnt Tip. Tropical specimens arrived at Darwin's

request from Joseph Hooker and the renowned orchid importers, James Veitch and Sons. All these offerings entered Darwin's rented Regency townhouse overlooking the seaside village.

Due to his own poor health and the time needed to study so many specimens, Darwin does not appear to have spent many hours walking – or crawling – in the warm sun.[14] In fact, Darwin often relied on the work of his son, George, who celebrated his sixteenth birthday during the trip. Armed with nets and bell jars, George played an important role in gathering information about the pollination strategies of the south Devon orchids (and, on other occasions, species near the family home in Kent).[15] Indeed, further questioning his biographers' account, when Charles did make it outside, there was very little warm sun in Devon that summer: meteorological reports from the area record monotonously drizzly, overcast, and cool conditions.[16] It also appears that Darwin spent little time looking at the living plants: 'At Torquay I watched for about half an hour a number of these flowers [Autumn Lady's-tresses] growing together… The next day I watched the same flowers for a quarter of an hour and caught a humble-bee at work.'[17] Charles does not mention watching the colony again.

Although he may not have spent much time in the field examining Autumn Lady's-tresses (*Spiranthes spiralis*, referred to as *Spiranthes autumnalis* at the time), Darwin observed how the species' flowers open in a spiral up the flower spike so that the longest-opened flowers are nearest the ground. He saw that their 'humble-bee' pollinators always alight at the lowest flowers, then crawl spiral-wise up the spike. He saw that on first opening, the flowers have a very narrow passage between the column and the labellum where the insect's proboscis enters. That confined space ensures that the proboscis enters in exactly the required position for the pollinia in the flower to make contact and adhere to it and be removed as the proboscis withdraws. That passageway remains narrow for a couple of days after the pollinia have been removed, too narrow for a proboscis already carrying pollinia to enter. Darwin realised that this means newly opened flowers cannot be fertilised and a bee which has just received the pollinia from that flower cannot reinsert its proboscis into the same or any other flower on the same plant because the passages of all the flowers that have only recently (or not yet) had their pollinia removed are too narrow for its proboscis carrying pollinia to enter. As Darwin notes: 'the young flowers, which have their pollinia in the best state for removal, cannot possibly be fertilised; they must remain in a virgin condition until they are a little older and the column has moved away from the labellum'.[18] Reaching the top of the flower spike, thwarted in its attempts to access more nectar on the same plant, the bee flies off to try its chances at another honey-scented orchid. There it follows the same foraging pattern until it encounters a flower where sufficient time has passed since its pollinia were removed. That being the case, the passage to the nectar will have widened. The bee

carrying pollinia can insert its proboscis. In the process, some pollen will transfer to that flower's stigma enabling pollination.

Autumn Lady's-tresses were one of three species local to Torquay which Charles and George examined. Local colonies of Pyramidal Orchids (*Anacamptis pyramidalis* known to Darwin as *Orchis pyramidalis*) revealed how their flowers were also honed to enable cross-fertilisation: grooves in the labellum guide the proboscis of pollinators (which, Charles and George ascertained, were moths) into the nectary like 'the little instrument sometimes used for guiding a thread into the fine eye of a needle' the passage to the nectary is partially closed by a 'trapdoor' formed by the flower's rostellum which, when ruptured by the passing of a proboscis, releases the viscid disc contained within it, attached to which are a pair of short caudicles and the flower's twin pollinia.[19] Kept moist within the rostellum, the saddle-shaped viscid disc is very sticky. Once removed from the rostellum, it dries on contact with air and firmly wraps around the passing proboscis. At the same time the pollinia move from their initial upright position through a double movement: first, diverging slightly then sweeping forwards 90 degrees until, within about 30 seconds of their removal from the flower, the pollinia lie along the plane of the proboscis. There they wait, in the optimum position to contact the twin stigmatic surfaces of another Pyramidal flower when the moth, seeking nectar, inserts its proboscis. 'As in no other plant, or indeed in hardly any animal,' Darwin concluded, 'can adaptations of one part to another, and of the whole to other organisms widely remote in the scale of nature, be named more perfect than those presented by this Orchis'.[20]

Woodcut illustrating pollinia of Bee Orchid from Darwin (1862)

The third local species growing around Torquay was the Bee Orchid (*Ophrys apifera*). The Bee proved problematic. Darwin's investigations revealed that orchids possess complex mechanisms to guarantee cross-pollination. Supporting his theory of natural selection these 'adaptations of one part to another' must have developed over countless millennia. The Bee contradicted this. The 'Bee Ophrys,' noted Darwin, 'differs widely from the great majority of Orchids in being excellently constructed for fertilising itself'.[21] He goes on, 'long and often as I have watched plants of the Bee Ophrys, I have never seen one visited by any insect'.[22] Unlike most other native and tropical species which required pollination by an insect, the Bee's pollinia, held on the end of long flexible caudicles, hang down far enough to contact the flower's

own stigma, affecting self-fertilisation. The result is very efficient seed production. This challenged Darwin's whole premise of co-evolution and cross-fertilisation. It is a challenge he reconciles by deciding that 'it seems almost certain that at some former period they [Bee Orchids] were adapted for cross-fertilisation, but that failing to produce a sufficiency of seed they became slightly modified so as to fertilise themselves'.[23] He even wonders whether the Bee 'will ever revert to its former state [requiring fertilisation by insect]; and if it does not so revert, will it become extinct?'[24] It is not a question Darwin can answer; however, simply stating it suggests that, as an exception to nature's laws (and Darwin's theory), the misfit Bee may well be doomed.

Initially, Darwin thought his months of research might lead to a paper 'not of much importance'.[25] Instead, it became a book-length study that, in addition to (and because of) revealing the secrets of orchid flower morphology and pollination mechanisms, served as a key companion volume to '*On the Origin of Species*'. As Darwin wrote:

> In my volume 'On the Origin of Species' I gave only general reasons for the belief that it is an almost universal law of nature that the higher organic beings require an occasional cross with another individual . . . Having been blamed for propounding this doctrine without giving ample facts, for which I had not sufficient space in that work, I wish here [in *On the Various Contrivances*…] to show that I have not spoken without having gone into details.[26]

Although it was the volume which provided the 'ample facts' to illustrate Darwin's 'doctrine' it never achieved the renown of '*On the Origin of Species*', the contents of which continued to be fiercely debated while Darwin dissected orchids in his rented seaside house. For the same reason, Galápagos tortoises and finches are more usually associated with Darwin's epoch-defining theory than Britain's native orchids, even though the latter were vital to substantiating his ideas.

Today, these fascinating plants also remind us of what Britain has lost since Darwin's time in Torquay. A blue plaque on the grand façade of 2 Hesketh Crescent overlooking the bay commemorates Darwin's stay there, but BSBI maps indicate that none of the species Charles and George observed have been recorded in the immediate vicinity of Torquay for over a decade: no Bee or Pyramidal Orchids since before 2000; no Autumn Lady's-tresses since before 2009. The man and his work are remembered, but the demise of the orchid colonies he studied tells a sad tale of an on-going loss from our natural and cultural history.

Footnotes

[1] Darwin to W. D. Fox, 8 July 1861, in Darwin, Correspondence 9, p. 196.

[2] Darwin to C. Lyell, 20 July 1861, ibid., p. 213; ibid., p. 227, fn. 12.

[3] Wilson, Charles Darwin, p. 269. Wilson's account seems to (confusingly) conflate sundews with orchids when he observes that Darwin's research proved that 'the apparently meaningless ridges and horns of the sundew and other orchids were weapons in the struggle for survival' (p. 269).

[4] Darwin, Orchids, pp. 34-35.
[5] Darwin to the *Gardener's Chronicle*, 4-5 June 1860, *Correspondence* 8, p. 236.
[6] Edens-Meier and Bernhardt, *Darwin's Orchids*, p. 5.
[7] Darwin to J. D. Hooker, 28 July-10 Aug 1861, *Correspondence* 9, p. 223: 'It is mere virtue which makes me not wish to examine more orchids, for I like it far better than writing about varieties of cocks & Hens & Ducks'.
[8] Darwin, *Orchids*, p. 12.
[9] Ibid., p. 13.
[10] Darwin to J. D. Hooker, 13 July 1861, Correspondence 9, p. 201.
[11] Darwin to J. D. Hooker, 28 July-10 Aug 1861, ibid., p. 222.
[12] Darwin to C. Lyell, 30 July 1861, ibid., p. 213.
[13] Desmond and Moore, *Darwin*, p. 509.
[14] Darwin to C. Lyell, 29 July 1861, *Correspondence* 9, p. 213: 'I have actually walked I believe a good two miles out and back, which is a grand feat'.
[15] Darwin refers to George's contributions in *Orchids*, pp. 16, 61, 67, 120.
[16] Met Office, Digital Archive.
[17] Darwin, *Orchids*, p. 113.
[18] Ibid., p. 121.
[19] Ibid., p. 20.
[20] Ibid., p. 23.
[21] Ibid, p. 52.
[22] Ibid., p. 55.
[23] Ibid., p. 58.
[24] Op. cit.
[25] Darwin to J. D. Hooker, 17 July 1861, *Correspondence* 9, p. 215.
[26] Darwin, *Orchids*, p. 1.

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Elements of this chapter can also be found in *The Orchid Outlaw* published by John Murray Press.

Conservation Work at Cliburn Moss NNR

Alan Gendle

Fen at Cliburn Moss NNR (top) with before (middle) and after (bottom) the conservation work.

Photos by Alan Gendle

Cliburn Moss NNR is in Cumbria and a well-known site for Lesser Twayblade (*Neottia cordata*) and Creeping Lady's-tresses (*Goodyera repens*) It also has Lesser Butterfly-orchids (*Platanthera bifolia*) on site. The reserve contains a fen between the eastern and western areas of woodland. The fen is fed by an underground water source augmented by rain water. Maps from the 1800's indicate the presence of a fen.

Over the years the fen had become over grown mainly by invasive willow due to changes in the water levels. Natural England decided to try to remove the willow and I, as assistant warden, was tasked to commence removing it. Work was carried out during autumn, winter and spring when conditions were conducive to successfully using herbicide. The willow was cut down with loppers or bow saws and the stumps treated with SBK herbicide diluted 50% with water. It needs to be +4 degrees and forecast dry for 24 hours for the herbicide to work successfully. Natural England staff occasionally assisted with attacks on the small willow with brush cutters.

All the cuttings were removed from the fen and shredded in a chipper and spread on the paths around the reserve. The work started in the autumn of 2018. There had always been a few Lesser Butterfly-orchids on site but in the summer of 2019 a count of the orchids was made in the area cleared over the previous winter months. A total of 24 flowering spikes, were recorded, much greater than had ever been seen previously.

The clearance work continued and the orchid count increased: in 2020, 34 spikes; in 2021 48 spikes; in 2022, 64 spikes. This year in 2024 a very quick count was made, and numbers increased to 67. Pleasing for an orchid classed as vulnerable. The added bonus was that more Common Spotted-orchids and Northern Marsh-orchids have appeared over the last three years. There are still more years of clearance work ahead and hopefully even more Lesser Butterfly-orchids to count but this is an ongoing conservation success story at Cliburn Moss NNR.

Lesser Butterfly-orchids (*Platanthera bifolia*) in the fen at Cliburn Moss NNR.

Photos by Alan Gendle

The Amphi-Atlantic Distribution of Irish Lady's-tresses

Frank Horsman

The recent outbreak of avian flu in England, witness the Farne Islands, has led to intensive research into the vectors which transmit living material, in this case viruses, across the Atlantic Ocean from the British Isles and Ireland to north America. Because humans can catch avian flu there has been some urgency in this research. As a by-product more light has been shed on the numbers and species of birds carrying plant seeds between continents.

The Irish Lady's-tresses (*Spiranthes romanzoffiana*) occurs on both sides of the Atlantic Ocean. The main centre for the genus *Spiranthes* is in the north-east of America (Wille *et al*., 2011). The question then arises as to whether *S. romanzoffiana* has spread from America to the British Isles and Ireland. If so, how did it spread; that is, what were the vectors by which the dust-like seed of this orchid was translocated from America to the British Isles and Ireland? Horsman (2005) discounted winds and the genetics of the American and British populations are not fully understood.

Exploratory movements of inexperienced birds play an important role in seed dispersal (Wilkinson, 1997). Gulls are prone to avian flu. Approximately 5% of Great Black-backed chicks ringed in Newfoundland, where this orchid grows, found their way across the Atlantic to Europe (including the UK) instead of taking their usual route due south to the coastal United States (Wille *et al*., 2011). Vagrant seabirds, shore birds, and waterfowl, often immature, are known to stray in both directions across the Atlantic (Peterson, 1980). *S. romanzoffiana* grows in Newfoundland. The following ringed individuals with a European origin have been recorded on Newfoundland: Barnacle Goose (1 ringed individual), Eurasian Wigeon (5), Great Skua (13), Black-headed Gull (1), Eurasian Teal (1), European Herring Gull (1), Black-legged Kittiwake (102), Purple Sandpiper (1), Brunnich's Guillemot (15), and Atlantic Puffin (50) (Caliendo, 2022). Tens of thousands of migratory birds move from North America along the East Atlantic Flyway (Newfoundland – Greenland – Iceland – British Isles and Ireland) on their way to and from breeding and non-breeding grounds. (Gudmundson *et al*., 1993 & 1995). Flyways represent generalized migration movements of birds with most using only portions of the flyways.

The question then arises as to why *S. romanzoffiana* hasn't been recorded from the staging posts for gulls crossing the Atlantic, in either direction, namely Iceland and Greenland? What regenerated my interest in this subject was my discovery that a plant also with an amphi-Atlantic distribution has been recorded from Greenland, namely, *Limosella australis*, the Welsh Mudwort, from Qagssiarssuk at, significantly in this context, the southern tip of Greenland (1969, E.C.Smith Herbarium, Acadia University, Catalogue number ECS006920). It is not known if Greenland or Iceland

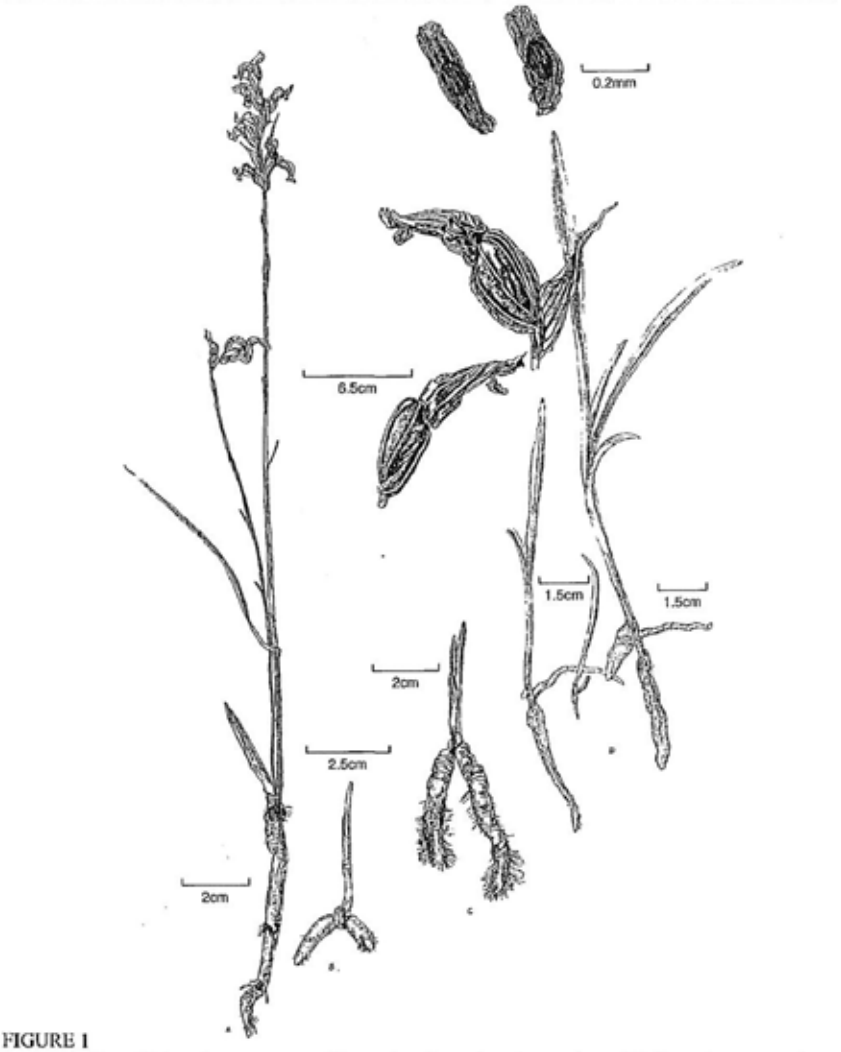

FIGURE 1

A. Lough Beg. *Spiranthes romanzoffiana* showing tuber & remains of 2 flowering stems from summer. Note small tubercles at end of tuber. (November. 7. 1969).

B. Lough Neagh. Young tubers found on the site of plant which flowered 1968.

C. Lough Corrib. Leaf spike of next year's plant from flowering stem 1969: note root hairs and small white shoot on stem.

D. Above studies of root system of young *S. romanzoffiana* from Lough Beg & showing adventitious root on each 6/7/79.

All del. Raymond Piper © 2005

Line drawings of Irish Lady's-tresses by the artist Raymond Piper (1923-2007)

have been worked for this orchid at the right time, namely, when it is in flower. It flowers late. The leaves are grass-like so it can't be spotted when it is not in flower. In the British Isles and Ireland *L. australis* is restricted to two small areas of Wales. Interestingly, and perhaps significantly, one of these areas is near the site where *S. romanzoffiana* was recently discovered in Wales.

As a postscript, I have just come across further data published by Merkel *et al*. (2019). They report 479 ringed bird recoveries from western Europe to north America as follows (they are similar, as one would expect, to the above): Light-bellied Brent Goose (95 recoveries), Eurasian Wigeon (5) Great Skua (18), Black-headed Gull (9), Black-legged Kittiwake (208), Ruddy Turnstone (41), Red Knot (32), Brunnich's Guillemot (17), Atlantic Puffin (54). Black-legged Kittiwake is a sea bird which over-winters off Newfoundland, where this orchid grows, so does it come into contact with *S. romanzoffiana*? In any event the theory that the seed of *S. romanzoffiana* was carried across the Atlantic from north America to the British Isles by birds certainly can't be ignored.

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Perthshire Field Trip 30th June 2024

Roy Sexton

Dave Trudgill, who is a regular contributor to *JHOS,* volunteered to run a Scottish field trip to orchid sites close to his home in Perthshire. In the Autumn 2023 volume of the journal David described how over the last 23 years he had created a wild orchid meadow in former agricultural land adjacent to his cottage near Blairgowrie. I asked if he would show us round the meadow as part of his programme.

It was spectacular and underneath a carpet of Ox-eye Daisies, buttercups and Yellow Rattle were thousands of native orchids which he had introduced as seed 'broadcast on the breeze'. Stars of the show were the Pyramidal Orchids which have a much more restricted coastal distribution in Scotland, indeed many Scots would never have seen them. Also in flower were Lesser and Greater Butterfly-orchids, White and Broad-leaved Helleborines, Twayblades, a Bee Orchid, Heath Fragrant-orchids,


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Early Marsh-orchids, Heath Spotted-orchids, Northern Marsh-orchids, Common Spotted-orchids and Green-winged Orchids. It was a paradise for two in the group who were well on their way to photographing all the orchids native to the British Isles.

The picnic lunch revealed that although we visitors had not met before we lived quite close together and David had trouble stopping us excitedly sharing information about other orchid rich meadows in Central Scotland. Orchid fanatics rarely meet in this part of the world and on reflection this was perhaps the most important part of the day.

In the afternoon the manager of the adjacent estate proudly showed us two colonies of Bird's-nest Orchids he had been actively conserving. We then drove 15 miles north into the uplands east of Pitlochry to search for Small-white Orchids. David had been told some had been recently found in an area with mounds of glacial moraine near the Field Studies Council Centre at Kindrogan (which closed two years ago). It was immediately obvious that the hillocks were botanically very rich with masses of Rock-rose, Heath Fragrant-orchids, Field Gentians, Yellow Rattle, Pignut, Creeping Willow, Golden Rod and other species. We eventually found 50-60 Small-white Orchids – mission accomplished.

Before we left we had a brief discussion about the future of HOS Scottish Field Trips. There were only 7 of us on this one which was rather disappointing, yet we all found it a very valuable experience, especially for the contacts we had made. In fact there are relatively few HOS members with addresses in Scotland. Most of us are actively involved in orchid conservation and every weather friendly day during the flowering season is precious for monitoring work.

There were two suggestions of ways forward. The first was that we should have a have a winter slide show and get together to talk about the work we are doing. The second was that we should put up a HOS display at the Scottish Botanists Conference in November at the Royal Botanic Gardens Edinburgh as this is usually attended by 200 people giving a chance to recruit a few more members.

Fig. 1: Dave Trudgill's Perthshire orchid meadow.
Fig. 2: Pyramidal Orchid (*Anacamptis pyramidalis*) in Dave Trudgill's meadow – a rarity in inland Scotland.
Fig. 3: Small-white Orchid (*Pseudorchis albida*).

Photos by Roy Sexton

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