



photo: H. Hawker

### Kirkbean, Dumfries & Galloway

Bryan Smith, Frank Katzer, Lindsey Holleworth, Bridget Laue, Paul Sharp, Ann Robbins, Gill Smith, Frank McGavigan (*behind*), Ken Trewren, Paul Ripley, David Hawker, Roland Ennos, Sandy Strang, Yvonne Golding, Mike Canaway, Bruce Brown, Alison Evans, Alec Greening, Linda Greening, Jonathan Crowe, Ann Stark, Janet Dyer, Roger Golding, Pat Acock, Adrian Dyer

In glorious weather 26 of us gathered to explore a number of different habitats in a relatively small corner of Kirkcudbrightshire (now part of Dumfries and Galloway), south of Dumfries. Our guide was Adrian Dyer who had brought groups of students here on field trips in the past. With his detailed notes in hand we knew what to expect, but in the decade or more since he had last been here some species had inevitably disappeared. However, with so many experts in our group it was clear that we would also record new finds.

**Kirkbean Glen** (entrance at 25/977592). This steep-sided wooded ravine has a mixture of soil types, allowing a wide range of ferns to flourish. Even before we reached the glen proper we were recording *Asplenium trichomanes*, *A. rutamuraria*, *A. adiantum-nigrum* and *Polypodium interjectum* on old walls. Once in the wood we very quickly ticked off *Athyrium filix-femina*, *Blechnum spicant*, *Dryopteris affinis*, *D. borrieri* (with Ken Trewren with us there was no way we were going to get away with lumping them all as *affinis* agg.), *D. dilatata*, *D. filix-mas*, *Polypodium vulgare*, *Polystichum setiferum*, *Pteridium aquilinum*, and at the bottom of the gorge, *Asplenium scolopendrium*. There was no sign of the *Cystopteris fragilis*, *Gymnocarpium dryopteris* or *Phegopteris connectilis* that had been reported from here in the past. Perhaps the pathway that the local authority constructed round the glen, or erosion on the steep sides of the ravine, had destroyed their habitat. On the other



photo: R. Golding

**Kirkbean Glen. Pat Acock with a large *Dryopteris* × *complexa***

hand, Ken, who ventured with a few other intrepid explorers down to the bottom of the gorge, discovered *Trichomanes speciosum* gametophytes in several places among the overhanging rocks. On higher ground he verified finds of *Dryopteris* × *complexa* and (later) of *Polystichum* × *bicknellii*. With 17 taxa in the bag we deserved our lunch in the nearby beautiful village of New Abbey, where most of us took a few minutes to view *Matteuccia struthiopteris*, which has been flourishing there on a roadside verge (25/9603 6637) for many years.

**Preston Merse** (25/9455). In contrast to the morning, Saturday afternoon was spent on more open, flatter ground, firstly at Preston Merse, effectively a fen, which is one of only two known sites in Scotland for *Thelypteris palustris*. I had warned participants to wear wellingtons but in some cases even these were not enough protection as I foolishly led the party to the site by the wettest possible way, which involved negotiating deep, squelchy mud, and pools and streams too wide to jump. But this route enabled us to find *Equisetum arvense*, *E. fluviatile*, *E. palustre*, *E. sylvaticum* and *E. × litorale*. We also noted *Athyrium filix-femina*, *Dryopteris dilatata*, and *D. filix-mas*, before eventually reaching the *Thelypteris*. Good to see it flourishing, but not exactly an exciting fern. We found a drier route back, much to everyone's relief.

**Southernness** (25/9754). A short drive took us to an area on the edge of Southernness Golf Course (25/971547) where Adrian and his students had found *Ophioglossum vulgatum*, but recess in 2007 and again in May 2008 had found no sign of it. So we were not hopeful, and despite a police-type sweep of the ground we could find no trace of this elusive fern. David Hawker, the local vice-county recorder who had joined us for the day, promised to ask the greenkeeper to change the grass-cutting regime in the hope that by reducing the competition the adder's tongue would reappear. We did note in the surrounding area, however, *Dryopteris carthusiana*, *D. dilatata*, and their hybrid, *D. × deweveri*, along with *Athyrium filix-femina*, *Equisetum arvense* and *Pteridium aquilinum*.

**Rockcliffe** (25/8453). Our final visit on Saturday was to a colony of *Asplenium ceterach* on a wall on the upper track going north-west out of Rockcliffe village. About half of the plants were still desiccated as a result of the long dry spell earlier in the summer while the other half had been rejuvenated by recent rain, so it was a good lesson in the resurrection properties of this fern. On the way we noted other wall ferns: *Asplenium adiantum-nigrum*, *A. ruta-muraria*, *A. scolopendrium*, *A. trichomanes*, and both *Polypodium interjectum* and *P. vulgare* (though personally I find these two increasingly difficult to tell apart). On the ground were *Dryopteris affinis*, *D. borrieri*, *D. dilatata*, *D. filix-mas* and *Pteridium aquilinum*. That evening we had a communal meal at the Clonyard House Hotel, a good opportunity to talk ferns and generally put the world to rights.

**Sandyhills** (car park at 25/891553). Sunday morning saw us examining the coastal rocks and cliffs east of Sandyhills, only accessible at low tide. We found *Asplenium marinum* along with *A. adiantum-nigrum* at 25/8989 5534, and, in the steep gullies cutting into the cliffs, *A. scolopendrium*, *Athyrium filix-femina*, *Blechnum spicant*, *Dryopteris affinis*, *D. borrieri*, *D. dilatata*, *D. filix-mas*, *Pteridium aquilinum*, *Polystichum setiferum* and at 25/9057 5532 *P. aculeatum* with their hybrid *P. × bicknellii* close-by. I had hoped to find *Polypodium cambricum*, as all the polypodies and their hybrids have been recorded from the Kirkcudbrightshire coast, but every one located was declared to be *P. interjectum*. Ken again found *Trichomanes speciosum* gametophytes, in a cave at 25/8988 5533. We had lunch at the Stuffed Olive café in Colvend where the owner explained that at her farm home there were "rare ferns" on a barn wall. We promised to visit later.

**Clawbelly Hill** (25/8860). But first we were due to visit yet another habitat, the open, acidic slopes of Clawbelly Hill (used as rough grazing in the winter but left fallow in the summer). Here, as you would expect, we found *Athyrium filix-femina*, *Blechnum spicant*, *Dryopteris affinis*, *D. carthusiana*, *D. dilatata*, and *Oreopteris limbosperma* (which had, for the first time for me, a definite lemon scent), with of course the ever-present bracken. But the main reason for being here was to visit an *Osmunda regalis* site (25/8834 6075),

originally one plant but now two clumps. Their only threat was the possibility of being shaded out by a self-sown rhododendron plant, which Alan Crichton, the local farmer who had accompanied us, promptly pruned severely with his knife.

**Clonyard Farm** (25/910578). Our final (unscheduled) stop was to the farm where we had been promised “rare ferns” on the inside wall of a barn. There were several plants of what appeared to be *Asplenium trichomanes* subsp. *pachyrachis*, and, certainly the fronds hugged the surface of the wall in the way *pachyrachis* is supposed to do. (Pat took a frond for verification by the NHM, where it was declared to be a known, but as yet unnamed, subspecies. It is in the queue for DNA analysis.) Back at the farm we found *Polypodium interjectum* and some red-stemmed *Athyrium*.

We ended the weekend with a barbecue among the sea lavender on Rockcliffe beach, splendidly organised by Ann Robbins. What better way to finish a wonderful field trip, blessed by glorious weather and lots of interesting ferns?

## **SWANAGE, ISLE OF PURBECK, DORSET – 20-21 September**

**Robin Walls (Saturday) & Graham Ackers (Sunday)**

Saturday morning was sunny, the weather forecast good and even the name of the meeting place augured well. So what could go wrong? Thanks largely to Ted Pratt’s planning and leadership, nothing did and the 19 people who accumulated in Bon Accord Road had a lovely day with some exciting finds.

We organised ourselves into a minimum number of cars to travel the short distance to Durlston Country Park (40/031773) where we started by hunting for *Ophioglossum vulgatum* in rough grassland. Plants were still visible late in the season, in fact more so as they were yellowing and sorrel appeared to be absent from the field. Along the margins were a few small *Equisetum telmateia*, but we were to see more impressive specimens at the end of the weekend.

During the walk to the sea we encountered most of the usual local woodland ferns – *Asplenium scolopendrium*, *Polystichum setiferum*, *Dryopteris filix-mas*, *D. dilatata* – and one *D. affinis* agg. with the inevitable discussion. The conclusion was ‘more *D. borrieri* than *affinis*’. The objective of the walk was to see a fine colony of *Asplenium marinum* by looking over a wall with our backs to the splendid view of cliffs and seabirds. The wall was constructed to access a quarry (Tilly Whim caves) and the gate was locked. Ted had enquired about a key only to learn that the lock was rusted beyond repair. This did not deter the adventurous pteridologists and several agile members found ways to gain a better view. Rather bizarrely, accompanying the spleenwort were several plants of sea aster about 40 metres above their normal home in saltmarsh subject to occasional tidal inundation.

BPS meetings are not noted for missing lunch and on this occasion we enjoyed the food in the café claiming the best view in Dorset. Sitting in the sunshine with the whole of Poole Bay in front of you and a hazy view of the Needles beyond Old Harry was certainly no hardship.

We returned to our cars, finding that the walls nearby supported wall rue (*Asplenium rutamuraria*) and a very small polypody. After a quick stop to see rustyback (*A. ceterach*) on the wall in the next road, we went to Hartland Moor (30/941842) for a decidedly moister and more energetic excursion. Ted explained that we were to scour a valley mire for *Dryopteris* × *deweveri* (*D. carthusiana* × *D. dilatata*) and divided us into four teams, each having a leader who admitted to being able to recognise the hybrid and a person with a GPS. We were in for a walk and to make it interesting on the way we looked for a scarce grass *Deschampsia setacea* and a smooth snake (both unsuccessfully) but as consolation found large plants of *Osmunda regalis*. Dorset heath (*Erica ciliaris*) was plentiful and well in flower to distract us, but we managed to spot *Blechnum spicant*, *Athyrium filix-femina*, rather leathery *Dryopteris filix-mas* and a few *Osmunda* sporelings.

My party arrived at a pond (30/947848) noted for *Pilularia globulifera* and after a little searching found some, although not as much as had been recorded in a report from 1990 that Alison Paul had thoughtfully brought with her. We did find two new records of scarce flowering plants: *Potamogeton obtusifolia* and *Callitriche brutia*. Just as we were leaving the pond, Sue Dockerill spotted a better colony of *Pilularia*, about a square metre in extent.

So to the search. Although the mire is located in typical heathland it is flushed by relatively base-rich water and has a wide range of species. So, an exciting place to be, but structurally it is dominated by *Molinia* tussocks and hard work. *Dryopteris carthusiana* and *D. dilatata* were present and my team found five possible hybrids and collected fronds from three of them. Unfortunately very few plants had sori and most were rather young. Most of the fronds that did have spores later proved to be *D. carthusiana* but at least one was confirmed by Roger and Alison to be *D. × deweveri*. As if this was not exciting enough, Sue topped her earlier success by finding a substantial stand of *Thelypteris palustris*. This was a new record for the site and a considerable distance from the next known site, which Ted had been keeping for the finale of the meeting on the next day! For the record, the other ferns we recorded in the fen were *Dryopteris filix-mas*, *Asplenium scolopendrium*, *Athyrium filix-femina* and *Osmunda regalis*. Amongst the wet heathland along the sides of the mire were stands of marsh gentians to delight the members with inadequate boots or enough sense to decline the dubious pleasures of searching *Molinia* mires. Overall, a good haul for a well botanised place – as Ted told us, the first NNR to be declared.

In the evening we entertained Ted and his wife Jo to dinner at a local restaurant.

Another wonderfully sunny day on Sunday saw us heading for the National Trust car park at the northern extremity of Studland Heath just before the Sandbanks chain ferry (40/036865). As our weekend leader had ecclesiastical duties that morning, armed with location information Pat Acock, helped by Robin Walls, led us to our first site (40/038860).



photo: A.M. Paul

#### ***Lycopodiella inundata* site, Studland Heath, Dorset**

Julian Reed, Graham Ackers, Andrew Leonard, Peter Tindley,  
Jonathan Crowe, Robin Walls, Brian & Sue Dockerill,  
Christine Mullins

Nestling amongst sand-dunes was a large circular damp depression hosting a multitude of bright green ribbons of foliage – a very large stand of marsh clubmoss, *Lycopodiella inundata*. This splendid sight occupied us for some time with many members of the party prostrating themselves for study and photography. However, once our knees had become thoroughly soaked, we returned to the car park where Ted Pratt awaited us.

Returning south in our cars, we stopped to observe a roadside polypod colony growing right beside a parked camper van. The family owners, who were sitting out beside their vehicle, observed our intrusion with a mixture of bewilderment, amusement and finally relief on our departure! The fronds were rather small and we were told that they were *Polypodium × mantoniae* – this I had to accept on trust because I have problems identifying polypod species, never mind hybrids! Continuing south we parked at the main Studland

National Trust car park with its visitor centre, shop and café (40/033835). From there we walked a short distance north into woodland harbouring *Pteridium aquilinum*, *Dryopteris dilatata*, *D. filix-mas* and *D. borrieri*. However, the main interest was a large colony of *Dryopteris affinis* subsp. *affinis*. These plants were obviously very old, with chunky rhizomes, some dead, some creeping and some erect giving the impression of a small tree fern forest. Furthermore, the fronds had been severely chewed



photo: J.P. Crowe

### Discussing *Dryopteris affinis* agg., Studland

Bryan Smith, Robin Walls, Pamela Simpson, Ted Pratt,  
Alison Paul, Christine Mullins

(by Sika deer we were told), adding further to this atmospherically bizarre scene. Although I felt this to be a potential conservation issue, Ted informed us that the deer's foraging did not seem to be putting the plants at risk, but for how long I wonder?

Following lunch, we walked again from the car park to the nearest accessible shore of Little Sea (40/033841). Wading in the shallows we found some plants of *Isoetes echinospora*, but rather more of the superficially similar *Littorella uniflora*. Ted helped us to differentiate the two.

We then drove to visit some disused clay mines (30/952826) at Norden Farm (note however, that this site is on private land). Growing on the infilled clay pits were pioneering silver birch plants creating lightly shaded woodland. On a previous visit, Ted had provisionally identified a plant of *Equisetum* × *litorale*, but despite intensive searching this hybrid could not be re-located. However, one of its parents, *E. arvense* was common. *E. palustre* was also found, including at least one plant of var. *polystachyon*. Within the clay mines area *E. telmateia* occurred in wet flushes and moving further south onto the lower wooded slopes of the Purbeck Hills we found *Asplenium scolopendrium*, *Athyrium filix-femina*, *Blechnum spicant*, *Dryopteris borrieri*, *D. dilatata*, *D. filix-mas* and *Polystichum setiferum* – an interesting mix of calcicole and calcifuge species.

Our final site of the day was The Moors near Arne (in the region of 30/945870 – but note that this again is private land and should not be visited without permission). En route through wet ground we encountered *Equisetum fluviatile*. As the ground became even wetter, we entered a woodland copse of willow and birch where *Thelypteris palustris* grew amongst hostile tussocks of the saw sedge, *Carex paniculata*. The marsh fern population was fairly substantial and we were pleased to note at least one fertile plant, rather unusual in this species. Other ferns noted within the copse were *Blechnum spicant*, *Dryopteris borrieri*, *D. dilatata* and *D. filix-mas*.

This day of enjoyable concentrated ferning ended with the usual farewells, and we were delighted to be able to show our appreciation to our leader Rev. Edward Pratt for his planning and execution of an excellent programme. His deep and wide knowledge of the British flora is impressive and his detailed knowledge of the Purbeck area was invaluable. It is worth mentioning that this year (2008) he has published a book *The Wild Flowers of the Isle of Purbeck, Brownsea and Sandbanks* (Brambleby Books). Despite its title this does include ferns, and provides a comprehensive guide to botanising the area – thoroughly recommended!

# LECTURE MEETINGS AND DAY VISITS

## AGM & SPRING MEETING, NATURAL HISTORY MUSEUM, LONDON - 5 April

Adrian Dyer

The AGM and associated programme of talks attracted a good attendance of over 40 members. After tea and coffee participants settled down to three accounts of overseas excursions. Alan Ogden presented a selection of photographs that gave a flavour of the extensive BPS field meeting to Texas in October 2007. He began by showing slides of the propagation facilities at Casa Flora nursery, which each year distributes 16 million young ferns worldwide. Alan clearly enjoyed his introduction to a range of habitats and an abundance of fern species. Having lost his notebook, Alan was unable to put a name to some of the ferns he showed and this prompted some audience participation, which provided up to three different identifications for each fern. Memorable photographs included *Anemia mexicana*, some impressively large botrychiums and several xeric species of arid habitats. These included the common *Pleopeltis polypodioides*, the so-called 'resurrection fern' and *Arachniodes*, *Notholaena*, *Cheilanthes* and *Pellaea* species. Many of these curl up their fronds in dry conditions to expose their undersides, protected by hairs or scales like our rustyback, *Asplenium ceterach*. This is presumably an adaptation to desiccation by reducing water loss.

We were then entertained by Michael Hayward with an account of a solo visit to look at ferns in New Zealand. A series of photographs of the high standard that we have come to expect from him provided, for those who went on the BPS excursion to New Zealand in 2000, a reminder of that country's pteridological treasures and, for those of us who have not been there, a glimpse of the fern flora to whet the appetite. In an almost rain-free four weeks in February 2007, Michael managed to see and identify about 120 species in a range of locations in both North and South Island including, on the Mahia peninsula, a large, untouched forest of Nikau palms and native hardwoods that harboured many fern species. As to be expected, tree ferns, blechnums and filmy ferns were much to the fore. Worth special mention were the curious *Blechnum filiforme* in regenerating woodland on Waiheke Island, which looked like a completely different species when it climbed up trees, *Dicksonia lanata* and *Blechnum fraseri* in the Kauri forests of North Island and *B. obtusatum* growing in sand at the top of the beach at Cape Foulwind, South Island.

The morning finished with a slide-show by Martin Rickard, listed in the programme as 'Réunion Excursion' but in reality a more wide-ranging tour of 'ferns with trunks', not all of which are *Cyathea* or *Dicksonia* species. We saw *Blotiella pubescens* and *Amauropelta* sp. as well as *Cyathea borbonica* (endemic to Réunion), *C. excelsa* and *C. glauca*. On La Réunion, these three *Cyathea* species share a remarkable feature not normally seen in tree-ferns: they regularly branch. Moreover, these branches become detached at the base during typhoons and, after falling to the forest floor, form roots and continue to produce fronds, becoming established as new plants. The branches are effectively vegetatively produced 'bulbils'. To what extent the production of detachable branches is the result of environmental factors is not known. It would seem remarkable if this was the only place in the world where the conditions produce this response. There is an article on this interesting aspect of tree-fern biology in the 2008 *Pteridologist*. Then Martin took us on a tour of blechnums with trunks. On Réunion, *Blechnum tabulare* becomes tree-like with tall trunks, even though in South Africa the same species has almost no trunk. *B. palmiforme* (Tristan da Cunha), *B. magellanicum* (Chile), *B. cycadifolium* (Juan Fernandez Islands, Chile) and *B. buchtienii* (Costa Rica) are other species that form distinct trunks.

Following the talks, a generous allowance of two hours allowed us to visit the Museum galleries and shop as well as to talk to fellow fern enthusiasts and make purchases from the Book Sales display, brought by Yvonne Golding in Frank Katzer's absence, and the Merchandise stall, brought by Bryan and Gill Smith. At 2pm, the President, Robert Sykes,

made a prompt start with the AGM. Because, for the first time, the Reports of the Officers and Committee Appointees as well as the examined Accounts had been printed in the *Bulletin* in advance of the meeting, business was conducted much more expeditiously than in recent years, and the meeting took little more than an hour. Reading through the Reports reminded me once again of the considerable amount of work required to maintain the Society's many and diverse activities and of the thanks due by all the members to the volunteers who contribute their skills and time to carry them out. I hope they realise how much their efforts are appreciated. The full Minutes of the AGM are to be found elsewhere in this *Bulletin*. The AGM finished on a happy note with the presentation of Awards. Chris Fraser-Jenkins and James Merryweather shared the first J.W. Dyce Award for the best contribution in a BPS publication during the previous year. Outstanding Service Awards were then given to James Merryweather, for ten years of editing the *Pteridologist*, and to Pat Acock, for at least ten years as Meetings Secretary, not forgetting all the many other ways he helps the Society to function. Pat was present to receive his certificate and engraved glass tumbler from the President.



photo: A.C. Wardlaw

**Pat Acock (right) receiving his Outstanding Service Award from President Robert Sykes, AGM 2008**

Rob Cooke then presented a thought-provoking lecture on 'Factors affecting fern distribution'. He initially pointed out the limitations of the fern distribution maps that we all consult. They do not convey anything about abundance and, unlike some maps of intensively studied animal species, they do not show where a species is absent, merely where it has not been recorded. Factors determining the distribution of a species include soil characteristics, geology and land use as well as climate but only in a few rare species is collecting a possible additional factor. Climate is a major influence in producing a particular distribution pattern, such as the south- and west-orientated distribution of the 'Atlantic' species *Dryopteris aemula*, *Hymenophyllum tunbrigense* and *Trichomanes speciosum*, but interruptions in the potential distribution result from the absence of suitable habitats and, for example, cause the disjunct localities for these species in the Weald of south-east England. In the case of the 'Continental' species *Thelypteris palustris*, the concentration of sites in East Anglia results from the anthropogenic loss of habitat when wet mineral soils elsewhere in its climatically-determined British range are taken over by agriculture. The underlying significance of climate means that fern species are liable to be affected by climate change, now generally agreed to be real even if the causes are still debated. Climate models predict drier summers and autumns and wetter winters as average temperatures rise. Although the responses will be slower than for animals, particularly birds and flying insects, distribution boundaries of ferns will move to higher latitudes and altitudes. This may be a threat to rare alpine species such as *Woodsia* and those in localised and specialised habitats such as *Lycopodiella inundata*, but may cause some southern and lowland species to become more common or widespread within Britain. A clear picture of these changes will only emerge if there is close monitoring of existing populations, including quantitative records, and searches made for newly-colonised populations. The BPS has a role to play in targeted recording of this type.

The day's programme finished with an unexpected bonus, a talk on 'The jumping spores of the Jurassic' by Peter Hovenkamp (Leiden) who happened to be visiting the NHM. Peter reported an investigation of the spore dispersal mechanism of *Angiopteris*, an 'ancient' Eusporangiate fern with a fossil history traceable back to the Jurassic. As the ripe sporangia, which do not have the thickened annulus of the 'modern' Leptosporangiate ferns, dry out and split, the spores within can be seen to move and even jump out of the capsule. They can be projected for up to four millimetres, a distance that would be sufficient to carry them away from the stationary air layer at the frond surface and into the moving air currents above for wider dispersal. Similar movements occur in spores that have been artificially removed from the sporangium and allowed to dry out, so it can be concluded that the movement is generated by the spores themselves. The spores are spherical, with a perispore surrounding the exospore layer of the wall. Close examination of the spores as they dry out reveals that as the spore volume reduces due to water loss, a point is reached when the exospore suddenly buckles inwards, pulling away from the spherical perispore, which remains rigid. This sudden cavitation, producing a vacuum 'bubble' between the two wall layers that can be seen under a microscope, causes the twitching and jumping of the spores. This can only happen once in each spore because the adhesion between the layers is not restored on re-hydration. This remarkable mechanism can now be added to the list of known spore dispersal mechanisms, almost all of which, except in the case of *Equisetum*, depend on activity in surrounding tissues rather than in the spore itself. This interesting account prompted me to wonder whether a similar mechanism occurs in our native *Osmunda regalis*, another ancient Eusporangiate fern with round spores. Something to look for in June.

Tea and cakes brought the meeting to an end, followed by the rapid, and in some cases long-distance, dispersal (no jumping observed) of the participants. Thanks are due to Pat Acock and Alison Paul for the interesting programme and smooth running of the local arrangements.

## **'FOCUS ON SPLEENWORTS', NATURAL HISTORY MUSEUM, LONDON – 1 November**

**John Edgington**

Ask pteridologists to vote for their favourite family, and the hot money will be on Aspleniaceae. No surprise, then, that 'Focus on Spleenworts' attracted over 40 members who, after passing through throngs of Museum visitors to the calm of the Palaeontology Department, enjoyed an absorbing day discussing this large, morphologically varied and ecologically diverse group.

As Harald Schneider reminded us in his overview, the Aspleniaceae have long puzzled taxonomists; the family, with its distinctive sori and clathrate scales, is recognisable enough, but reticulate evolution and promiscuous speciation via polyploidy and chromosome doubling have left the traditional morphological boundaries between genera hopelessly blurred. Tryon and Tryon (*Ferns and allied plants*, 1982) separated the large genus *Asplenium* from half-a-dozen small satellite genera, while a few years later Kramer and Viane (Aspleniaceae: in *The families and genera of vascular plants. Vol. 1: Pteridophytes and Gymnosperms*, 1990) lumped all 700 species into a single genus. Noting that a scheme such as Tryon and Tryon's entails the (now disfavoured) concept of intergeneric hybrids, Harald outlined the new classification that is emerging from the research programme he leads at the NHM. By comparing DNA sequences from different species, and requiring the emergent groups to be monophyletic (that is, comprise a common ancestor species and all its descendents), the team has drawn up a phylogenetic tree showing the evolutionary relationships between more than 200 species.

At the base of the tree, first to split from the ancestral lineage, is *Hemidictyum marginatum* (chromosome number  $x = 31$ ) and the small genus *Hymenasplenium*, distinguished by its long flattened rhizomes. Subsequent episodes of differentiation produced the remaining 200+ species, grouped into some twenty to thirty monophyletic clades, all with basal chromosome number  $n = 36$ ; these include *Asplenium marinum* – the type of the genus in a

group by itself, the *adiantum-nigrum* group, the *Pleurosorus* clade and many others. Temperate and tropical species generally segregate, showing that their geographical separation is of great antiquity. The recognition of Tryon and Tryon's satellite genera renders *Asplenium* paraphyletic. As Harald remarked, to recognise each clade as a separate genus would re-open the problem of intergeneric hybridity, at least for the temperate species; the solution proposed is to lump them all into the monophyletic genus *Asplenium*, big sister to *Hemidictyum* and *Hymenasplenium*. It will be interesting to see how well this phylogeny stands up when the team achieves its next objectives, of increasing the number of species studied to over 350, including distinctive taxa such as the apogamous triploid *A. monanthes*, and reconstructing the family's phytogeographical history.

Next, Fred Rumsey surveyed hybridity in Europe, where there are twice as many inter- and intra-specific hybrid spleenworts (at least 57) as species recognised by *Flora Europaea* (31, split roughly equally between diploid and polyploid). With a wealth of telling photographs, Fred showed that hybridity is more prevalent among polyploids. The diploid *A. hemionitis* for example, and the French endemic *A. jahandiezii*, have no recorded hybrids, while several hybrids are known between the tetraploid subspecies of *A. trichomanes* – the morphology of these nothosubspecies being as intractable as that of the subspecies themselves. Many species have variable genotypes; Turkish plants of *A. septentrionale*, for example, are diploid, while those from western Europe are autotetraploid. The historical confusion between *A. adiantum-nigrum* and *A. cuneifolium* in British collections is due to *A. adiantum-nigrum* itself being a highly variable tetraploid derived on several different occasions from crosses, in both directions, between *A. onopteris* and *A. cuneifolium*. Fred used other British examples, such as *A. × clermontae* (*A. ruta-muraria* × *A. trichomanes*), to show that hybridisation rarely occurs when both parents are present in similar abundance, being most likely when one is greatly outnumbered by the other. The apparent paradox is explained by the scarcity, in the latter case, of male gametes of the same species and so the greater chance of fertilisation by a foreign gamete. This situation presupposes that both parents are largely outbreeding species, while the rarity of hybrid formation in apparently favourable circumstances suggests something site-specific about the process. Fred applied these principles to show that *A. × jacksonii*, the infertile triploid hybrid between *A. adiantum-nigrum* and *A. scolopendrium*, ought to recur sporadically in the Channel Islands – and lo and behold, this year his wife noticed a “funny-looking fern” on a lane bank in Guernsey. They had refound *A. × jacksonii* at only its second world site.

The next two talks summarised years of painstaking research on the biogeography of two familiar and widespread species, *Asplenium ceterach* in Europe and *A. aethiopicum* in Africa. Steve Ansell described research on the European distribution of diploid and tetraploid races of rustyback, a project led by Johannes Vogel to search for glacial refugia in the Mediterranean basin. The cytotypes (also including hexaploids) are morphologically similar but have quite different distributions. Previously, diploids (subsp. *bivalens*) were rarely known and only from Italy and the Balkans but recent fieldwork has detected a much wider distribution across the central and eastern Mediterranean basin and Balkans. However, they are absent north of the line of maximum glaciation, extending through the Alps and central Europe to the Atlantic, where only tetraploids occur. This pattern is explained by alternative breeding systems and associated colonisation mechanisms. Diploid individuals are outbreeding and so diffuse only slowly from their centres of distribution, while tetraploids can reproduce from a single spore via intragametic selfing and are thus capable of long-distance dispersal, so-called ‘leading edge colonisation’. Moreover, analyses of chloroplast DNA show that diploids exist in numerous haplotypes, some quite restricted geographically. This diversity, suggestive of radiation from different glacial refugia contrasts with the more mixed population structure found among the widespread tetraploids.

Steve's work is a recent team effort by NHM staff. By contrast, Tony Braithwaite described a lifetime's study of the highly polyploid *A. aethiopicum* begun while a PhD student. Unlike

rustyback this fern is hugely variable, especially in dissection but also in frond size, from a few centimetres to one-and-a-half metres. Again unlike rustyback there are no diploid subspecies, the form with the lowest chromosome number (subsp. *tripinnatum*) being a tetraploid ( $n = 72$ ) of montane forest margins from South Africa to East Africa and Cameroon. The octoploid ( $n = 144$ ) subsp. *aethiopicum* extends to drier areas of Cape Province in South Africa and West Africa; a very small cytogenetically distinct form occurs high on Kilimanjaro. Dodecaploid plants ( $n = 216$ ) reach as far as St Helena and Madeira; hybrids between these geographical races are sterile suggesting they merit their subspecific rank, in contrast to the tetraploid, some of whose morphologically distinct forms cross freely producing fertile hybrids. As well as these sexual cytotypes there are several fertile apomictic forms tolerant of even drier conditions e.g. in Yemen, Saudi Arabia, Canary Islands and the Atlas Mountains. Tony demonstrated with striking photomicrographs how these apomicts produce the unreduced spores necessary for their life cycle by an abnormal (abbreviated) meiosis. He concluded that the dodecaploid and apomictic forms from the Atlantic islands are relict distributions and represent an earlier evolutionary stage than the evolution of these forms in southern Africa. Tony published preliminary results of his research as far back as 1986 (The *Asplenium aethiopicum* complex in South Africa. *Bot. J. Linn. Soc.* 93: 343-378) – his talk at this meeting suggests there is much more to come!

After lunch we visited the herbarium. We marvelled at the extraordinary variability of *A. aethiopicum* and the venation that distinguishes some of its forms (Tony has scoured the world's herbaria to gather the distribution data for his study), while Fred displayed sheets of all ten hybrid spleenworts found in Britain (eight interspecific and two intraspecific). Martin Rickard treated us to examples of hart's-tongue varieties, some from the early 18th century, while bemoaning rules that ban the use of Latin in new cultivar names – compare 'Crispum Faye' with 'Lingua cervina multifida folio' for style and content.

If the morning belonged to molecular taxonomy, gardeners and eco-tourists had their turn in the afternoon. It is difficult in retrospect to imagine how Martin could speak for 30 minutes on one cultivar of one species of fern, but he did and it was fascinating. Surely Martin knows more about *A. scolopendrium* 'Crispum' and its cultivars – 'Fimbriatum', 'Speciosum', 'Kaye's Superb', 'Zeal Dwarf', most of them illustrated with photos from members' gardens – than even Edward Lowe, whose *Our native ferns* enumerates 437 varieties of this species. Horticulturalists in the audience were clearly captivated – am I alone in wondering whether Martin's contribution was slightly hart's-tongue in cheek?

I have never been to Macaronesia (the 'fortunate islands'), whose spleenworts were superbly illustrated by Andrew Leonard in the final talk. Between them, Madeira, the Canaries and the Azores (Andrew did not discuss the Cape Verdes in detail) boast 93 fern species of which 17 are endemic; these 93 include 15 spleenworts. The Macaronesian flora is generally assumed to be a relict Tertiary flora of unglaciated oceanic islands, originally acquired by long-distance dispersal and distinct from the flora of, say, Africa – Tony Braithwaite's views about dodecaploid *A. aethiopicum* are consistent with this – but see Vanderpoorten, Rumsey and Carine (Does Macaronesia exist? Conflicting signals in the bryophyte and peridophyte floras. *Am. J. Bot.* 64: 625-639, 2007) for a critical analysis of the hypothesis. Be that as it may, Andrew's photos, each localised to an island so that geographical variations could be clearly seen made me determined to repair my grave omission. I have to find *A. azoricum*, distinguish *A. aureum* from *A. lolegnamense* and *A. octoploideum*, and decide for myself whether *A. terorensis* (an endemic named after the village of Teror in the Canaries) deserves species status. And I would like to help Andrew relocate the intriguing hybrid, probably *A. onopteris* × *A. ceterach*, which he found and photographed on Tenerife but cannot re-find. But just in case I (and you) don't have time for this, Andrew has kindly put his photographs on the web for all to enjoy – go to [www.andrew-leonard.co.uk/Aspleniums%20of%20Macaronesia/page1.html](http://www.andrew-leonard.co.uk/Aspleniums%20of%20Macaronesia/page1.html) for a visual treat. On that note we ended a stimulating day in the company of our favourite family.