Meeting reports 2019

Meeting report Saturday 19th January 2019
AGM, and botanical quiz by Martin Collins

The official business of the AGM took place in the morning and members will receive the minutes in due course. During lunch there was the opportunity to browse through the botanical books on sale, provided by Keith Simpson. A number of bargains were found by members. I snaffled The Frampton Flora (Richard Mabey, 1985), a snip at £3, to enjoy reading more about this remarkable work which we saw at Frampton Court at the IAPI meeting in July 2016. In the afternoon, Martin Collins laid on one of his famous quizzes, a feast of botany. The hearty main course was based on pairs of plants from the same family, with one of the species being named after a person. One species in each pair was edible (or drinkable); these were placed on one table and our task was to match them with their opposite number on the adjoining table. Specimens were diverse: mostly the actual food item or a tin or packet containing it, or the potted plant or a twig; occasionally an illustration in a book had to be used.

The tables set out with pairs of species; the food specimens are nearer on the chequered tablecloth. In the background is the leafless specimen of *Stewartia*. Photograph by Roger Reynolds.

Only a few pairs yielded their relationship easily, such as the Forsythia twig with olives: each in the olive family Oleaceae, and Forsythia named after William Forsyth. (See table of all plants and people on pages 4–5.) Once someone had identified some angular green fruits as okra, and a vague memory of the mallow family Malvaceae had surfaced, we were able to link a spray of Lavatera (tree mallow), named after J.R. Lavater. Flowering Christmas cactus (Schlumbergera) was fairly familiar, from Frederic Schlumberger, but it took a while to realize that the odd-looking fruit was dragon fruit, also from the cactus family Cactaceae. A woody fruit of Banksia was quickly recognized, and with some thought its family, Proteaceae, emerged, and eventually it was connected with Queensland (macadamia) nuts (Dr John Macadam). Not forgetting Sir Joseph Banks and Banksia; this pair of plants was one of several hitting the jackpot with both species named after people. A tin of akee fruit foxed us. Martin explained that it was named after Captain Bligh as Blighia sapida which is in the family Sapindaceae. This brought to mind the recent inclusion of maples and horse chestnut families in Sapindaceae, and a look on the non-food table picked up a twig of horse chestnut with its large and sticky buds. Another obscure pairing which required Martin's intervention was kumquat (Citrus (originally Fortunella) japonica, after Robert Fortune and a specimen of Choisya (after Jacques Denis Choisy), each in the orange family Rutaceae. One pair that we failed to connect was tea (Camellia sinensis) and Stewartia, provided as a potted plant, leafless. Stewartia is like a deciduous camellia, with peeling bark leaving patches of lighter colour on the stem. Both in the tea family, Theaceae, and a further double: Georg Kamel (Cameli); and John Stewart.

The turf specimens. Photograph by Roger Reynolds.

The pudding course, as it were, involved chunks of turf from Martin's garden containing what might be called weeds by some, in the vegetative state. The names of the species mentioned mammals or birds. Some were quickly recognized, others took longer with more lateral thinking. The names are given below.

Common name	Scientific name	Comments
Bird's-eye (germander) speedwell	*Veronica chamaedrys*	Bird's-eye is an older name for speedwells in general (according to Mabberley's Plant-Book).
Cat's-ear	*Hypochaeris radicata*	One of the several yellow-flowered composites such as hawkweeds and hawkbits.
Cocksfoot	*Dactylis glomerata*	A rather coarse grass in a lawn, easily distinguished by the flattened shoots. Probably it is the inflorescence, a spreading panicle with knobbly groups of spikelets, that is supposed to resemble a cock's foot.
Cranesbill	*Geranium* species	The fruit looks like a slender, tapering beak of a bird.
Dandelion	*Taraxacum officinale*	Common name supposed to come from dent de lion, i.e. lion's teeth, after the toothed leaves.
Fox-and-cubs (orange hawkweed)	*Pilosella aurantiaca*	Close relative of mouse-ear hawkweed, *Pilosella officinarum*.
Mouse-ear	*Cerastium fontanum*	Not to be confused with mouse-ear hawkweed.
Oxeye daisy	*Leucanthemum vulgare*	Or you may know it by the older name *Chrysanthemum leucanthemum*.

The plant pairs, and the people commemorated in the plant names, arranged in alphabetical order by family. Details of people come from Stearn's Dictionary of Plant Names for Gardeners, The Names of Plants by David Gledhill, and general sources on the worldwide web.

Family	Edible plant	Other plant	People
Araceae	taro *Colocasia*	dumb cane *Dieffenbachia*	Joseph Dieffenbach, head gardener at Schönbrunn Palace, Vienna, in 1830s.
Araliaceae	ginseng *Panax*	*Schefflera*	J.C. Scheffler of Danzig, Prussia (now Gdansk, Poland).
Boraginaceae	borage *Borago*	*Ehretia*	George Dionysius Ehret, 1708–1770, botanical artist.
Cactaceae	dragon fruit *Hylocereus*	Christmas cactus *Schlumbergera*	Frederic Schlumberger, Belgian horticulturalist, c. 1900.
Compositae	chicory *Cichorium*	*Gerbera*	Traugott Gerber, 1710–1743, German physician and botanist.
Cruciferae	mooli *Raphanus*	stock *Matthiola*	Pierandrea Mattioli, 1501–1577, Italian physician, botanist and writer.
Dioscoreaceae	yam *Dioscorea*	black bryony *Dioscorea* (*Tamus*)	Dioscorides Pedanios of Anazarbeus, Greek military physician.

Ericaceae	cranberry *Vaccinium*	*Gaultheria* (*Pernettya*)	Dr Jean François Gaulthier, 1708–1756, Swedish–Canadian botanist of Quebec. Dom Antoine Joseph Pernetty, 1716–1801, accompanied Louis Antoine de Bougainville, 1729–1811, on his travels.
Euphorbiaceae	cassava *Manihot*	*Poinsettia* (*Euphorbia*)	Joel Roberts Poinsett, 1779–1851, American statesman, who found *Euphorbia pulcherrima* c. 1828.
Guttiferae	mangosteen *Garcinia*	*Clusia*	Charles de l'Écluse (Carolus Clusius), 1526–1609, Flemish botanist and writer.
Labiatae	rosemary *Rosmarinus*	Australian rosemary *Westringia*	Johan Peter Westring, 153–1833, botanist, physician to King Charles XIII of Sweden.
Leguminosae	tamarind *Tamarindus*	false acacia *Robinia*	Jean Robin, 1550–1629, herbalist and gardener to Henry VI of France.
Malvaceae	okra *Hibiscus*	tree mallow *Lavatera*	J.R. Lavater, 17th-century Swiss physician and naturalist of Zurich.
Oleaceae	olive *Olea*	forsythia *Forsythia*	William Forsyth, 1737–1804, superintendent of Kensington Royal Gardens and St. James's Palace.
Oxalidaceae	carambola *Averrhoa*	*Oxalis*	Averrhoes, 12th-century Arabic physician, translator of Aristotle's work.
Polygonaceae	rhubarb *Rheum*	Japanese knotweed *Fallopia*	Gabriello Fallopio, 1523–1562, Italian surgeon, anatomist, pharmacologist.
Proteaceae	Queensland (macadamia) nut *Macadamia*	*Banksia*	Dr John Macadam, 1827–1865, secretary to the Philosophical Institute of Victoria, Australia. Sir Joseph Banks, 1743–1820, patron of the sciences, active in the Royal Society.
Rosaceae	Chinese pear *Pyrus*	*Kerria*	William Kerr, died 1814, superintendent of Botanic Garden Ceylon, collector of Chinese plants for Kew.
Rubiaceae	coffee *Coffea*	field madder *Sherardia*	William Sherard, 1659–1728, plant collector and writer, left vast herbarium to University of Oxford where he endowed a chair of botany.
Rutaceae	kumquat *Citrus* (*Fortunella*)	*Choisya*	Robert Fortune, 1812–1880, Scottish horticulturalist and collector in China, brought tea plants from China to India, wrote travel books. Jacques Denis Choisy, 1799–1859, Swiss botanist and professor of philosophy in Geneva.

Sapindaceae	Akee *Blighia*	horse chestnut *Aesculus*	Captain Bligh, 1754–1817, of mutiny fame, and for introducing breadfruit from the Pacific to the Caribbean.
Solanaceae	cape gooseberry *Physalis*	angel's trumpet *Brugmansia*	Sebald Justinus Brugmans, 1763–1819, Dutch botanist and physician.
Theaceae	tea *Camellia* (*Thea*)	*Stewartia*	Georg Kamel (Cameli), 1661–1706, missionary, botanist and illustrator in the Philippines. John Stewart (or Stuart), 1713–1792, 3rd Earl of Bute and patron of botany.
Urticaceae	stinging nettle *Urtica*	mind-your-own-business *Soleirolia* (*Helxine*)	Captain Joseph Francois Soleirol, 1791–1863, collector of plants in Corsica.

Meeting report Saturday 16th March
From pigment to paint

The March meeting at Bulkington was a workshop with Sheila Smith. Sheila started by showing her large collection of pigments and discussing why it is helpful to mix your own paints from the powdered pigment rather than buying ready-made paint. There are a couple of reasons for this. Firstly, you can buy the pigments and mix a single pigment when you are ready to use it, keeping the paint pure and fresh with a high concentration of pigment. Any unused paint could be kept and reactivated for use at a later date. Secondly, it is much cheaper to buy the pigment powder and mix your own than to buy ready-made paint in tubes or pans. Each participant was asked to bring a small specimen such as a leaf, grape, tomato, etc. to draw on cartridge paper and the drawing was then to be transferred onto watercolour paper or vellum. Sheila provided everyone with small sheets of prepared transfer paper to use to transfer the drawing. She made this by coating layout paper with a red earth pigment. This was then polished with a small piece of paper to prevent smudging. We were told that the red earth pigment was useful for transferring most drawings but if you were painting, for example, a yellow flower then a yellow earth pigment should be used. When the drawings had been made, Sheila distributed small pieces of vellum and explained the origin from animal skins, the different types of vellum available, and their uses. Contrary to expectation, it is necessary to use the rougher side of vellum, the hair side.


The workshop in progress, in the Garden Room at Bulkington Village Centre.

Types of vellum Manuscript—bleached and prepared both sides. This buckles easily and is mainly used for calligraphy. Classical—bleached and treated on one side only; you paint on the rougher side. Natural—treated on one side only but not bleached. Parchment—this is sheepskin and although cheaper than vellum is more greasy. Kelmscott—this is manuscript vellum coated with a form of gesso.

As we were using small pieces of vellum, this did not need to be stretched. The vellum was taped with removable tape to a small tile to keep the surface cool and to limit any buckling. The drawing was then transferred to the vellum using the transfer paper which was very easy to use and worked perfectly.

It was then the time to mix our paint. Sheila explained that any paint needs a binder mixed with the pigment. This can be gum arabic, egg white (known as glair) or egg yolk (used if the paint is to be egg tempera). For those wishing to mix watercolour paint, Sheila mixed a batch of distilled water, acacia honey and gum arabic which we shared. After

choosing the pigment we wished to use, a small amount was placed in a container and the liquid added one drop at a time until the required consistency was reached. This was tested by painting a small amount onto a piece of paper and letting it dry. When dry the paint should not dust off when rubbed—if it does then you need to add more gum arabic. Egg tempera is mixed using the yolk of a very fresh organic egg mixed with an equal part of distilled water. This mixture is then added to your chosen pigment drop by drop and blended well. The paint was tested by painting onto a small piece of paper: when dry, if the paint is too shiny you have used too much egg and the paint could crack; if the paint dusts off the paper, you have not used enough egg. Everyone then tried out their own mixed pigments on the vellum using the dry brush method of painting so not as to over-wet the vellum. Novices and experienced painters alike enjoyed the opportunity to mix paints from pigments under expert instruction, and to try painting on vellum.

Thanks to Sheila for a most informative workshop. Julia Blower

Meeting report Saturday 25th May

Pollination mechanisms

Fourteen IAPI members attended a very interesting and informative day workshop on pollination delivered by Roger Reynolds. The venue was at Cotesbach Educational Trust, near Lutterworth, Leicestershire. This is a new venue for IAPI and one that proved very convenient for most members, being situated just off the M1 and A5, and near the Fosse Way, the B4455 at this point. The place itself has an interesting history and the owner gave us a tour of the house, grounds, and archive centre in free moments during lunchtime and before leaving for the journey home, making it an enjoyable day in many different ways. An added bonus for some, was the opportunity to use the café facilities on site and tables were reserved for us, both inside and out; the rest of the members had a picnic. These opportunities to socialize with fellow members are an important part of the day as we are all spread out across the country with normally little opportunity to meet up. We were encouraged to wander around the grounds, which were semi cultivated, with paths through banks of wild flowers. We were able to collect specimens and being May, plants in flower were plentiful. There were lots of opportunities to watch pollinators in action.

The schoolhouse: Georgian, Grade II listed.

Interior of the schoolhouse: everyone keen to start the afternoon session.

Our meeting place on this occasion was in the schoolhouse. Although it was not used on our visit, there is a wood-burning stove which could be used in cooler weather. The room was cosy with tables down the middle and Roger's projection taking place at one end. There were facilities for making tea and coffee, and a large sink, so to our delight we were able to enjoy our usual tea, coffee and cakes! There were a number of electrical sockets around the walls, so with little trouble the room could be rearranged enabling members to use table lights and microscopes, etc

Having found the schoolhouse and refreshments, we settled down to an excellent presentation by Roger, which reminded me how very fortunate we are to have such knowledgeable and professional tutors among our membership. Roger is both a botanist and botanical illustrator, with that special ability to be able to communicate his subject clearly and interestingly, so that no-one felt they should have read a text book before attending the day! If we use the venue again and include a presentation, maybe we could ask that cloths might be suspended over the windows, and there are poles across the top of each window that could be used for this purpose. It was a pity the room could not be blacked out as the result was that some slides appeared to be rather pale. This was not Roger's fault, and although he must have been disappointed, he gave an apology and plodded on,


Janet Pope carefully dissecting a flower.

likewise in true British fashion no one complained. Roger began his presentation by looking at a lettuce; the lettuce was taken apart to see the meristem at the base. We saw a vertical section through the meristem and looked at the identical cell structure. Roger explained that, using this identical cell structure, geraniums are cloned for the commercial mass market. He emphasized the danger of cloning to wild plants in that, should the individual be infected, the whole species could be wiped out as there is no resistance through variation. We learnt how flowers protect their offspring from the process of natural cloning, using pollination to prevent this happening. How variation is achieved by adopting different methods of pollination with other individuals using insects and other animals, wind and water, to avoid self-pollination taking place. Roger discussed dioecious and monoecious plants, using examples such as the stinging nettle and red campion for dioecious plants, where stigmas and stamens appear on separate plants, and alder where male and female flowers appear on the same plant. The male and female parts of a flower can mature at different times, a process known as protogyny if the female is first and protandry if the male is first. In some plants this process takes place on the same plant as in the ribwort plantain, with the males maturing before the females. The primrose, a woodland plant, is dimorphic and has two kinds of flower presentations with stigma and stamens arranged in two different forms. The pin-eyed has the stigma uppermost above the stamens and the thrum-eyed has the stamens uppermost above the stigma. The purple loosestrife, which is found on river banks and in the fens, is trimorphic with three different presentations. After showing us all the different examples, Roger then talked about cleistogamy, where some plants are able to self-pollinate at a certain stage in their life without the bud opening, sometimes late in the flowering season as with violets. This is a characteristic of some of the viola family.

The transfer of pollen can take place using an agent such as wind. The pollen grains of plants that use this method are usually smooth, so that they separate easily in order to be moved about singly. Examples of wind pollinated plants are stinging nettles, which can throw their pollen into the air, and catkins on oak, beech, poplar, hazel, hornbeam and alder. The females have feathery sticky stigmas designed to catch the pollen as in grasses. Tree flowers which are wind-pollinated lack colour, and they usually flower before the leaves appear to avoid the leaves getting in path of the pollen grains in flight. Various animals, including humans, can transfer pollen. Some migrations coincide with the maturity of certain plants and flowers. In recent times global warming has caused a problem with the timing of plant and flower maturity. There is a whole list of animals that aid pollination of plants including monkeys, bears, deer, rabbits, lizards and rodents. In Australia the honey possum pollinates banksias and eucalyptus. Fossil records show that flowers evolved about 140 million years ago but pollen grains have been discovered from 240 million years ago – there is still much to be discovered! Flowers do not fossilize well and Darwin called the origin of the angiosperms “an abominable mystery”. It is thought that flowers and insects evolved together, a process known as mutualism. Roger explained that there are some mysteries and fascinating facts concerning pollination. For example, the ice-cream bean tree, Inga vera, can change the composition of its nectar so that in the daytime it can attract insects and, in the evenings, attract night-flying bats. The magnolias have no nectar and attract pollen-eating insects. In ivy the nectar forms on top of the ovary, available to any insect. In many plants where the nectar is inside the flower, the insects need feeding tubes appropriate to the length of the flower spur. Some plants, such as comfrey, have flowers that attract long-tongued bees, but short-tongued bees have discovered that, if they make a hole near the base of the flower on the outside, they can extract the nectar. This doesn’t bode well for the flower as it circumvents pollination. In order to advertise their small flowers, some plants have extra sterile flowers with large petals, as in the hydrangea, and some plants have coloured bracts designed to look like petals with true flowers in the centre, such as the poinsettia.


Sterile flowers with large petals around the inflorescence in hydrangea.


Nectar guides for pollinating bees.

Insects are helped by the flower to find their reward, usually nectar, by the presence of nectar guides. Bees can see ultraviolet and these guides show up very clearly. Horse chestnut flowers change the colour of their flowers as they mature making it easier for the insect to see which flowers are still available to visit. They start as flowers with yellow markings, which later turn red when mature or pollinated.

Amusingly some bees leave smelly footprints which act as an indication that the flower has already been visited. Moth-pollinated flowers are usually white and show up clearly at night. Occasionally a flower will capture an insect to help pollination. Magnolia grandiflora can hold a pollinator overnight. In some plants, bees produce vibration which makes the plant release pollen, a process known as sonification. After lunch Roger set up 15 stations around the table with various tasks for members to undertake, which demonstrated many of the examples we were shown during the morning. The easiest way to show the stations and their purpose is to look at the table below. All sorts of aids were available for these tasks including part of a vibrating toothbrush to recreate the buzzing of a bee.

1. Ribwort plantain. Changes in flower structure working down a protogynous inflorescence. 2. White deadnettle. Half-flower to see layout of the stamens and stigma. 3. Arum (Arum italicum). Identity of parts and pollination mechanism, including smell of spadix. 4. Flower scent. Cutting up a flower into separate pieces to see where scent is produced. 5. Iris structure. Looking at the construction of the iris in relation to its pollination mechanism. 6. Horse chestnut. Seeing the change in colour of the flower marking and seeing a difference in its smell. 7. Phalaenopsis orchid. Extracting pollinia and observing their movement once extracted. 8. Borage. Stimulating flower with an electric toothbrush to see if pollen can be released. 9. Centaurea flowers. Seeing the response of touching florets which releases more pollen. 10. Broom flowers. Looking at the explosive mechanism and how it works. 11. Slipper orchid. Examination of flower structure in relation to the mechanism of pollination 12. Veronica chamaedrys. Puzzle—how does pollination work in these flowers? 13. Salvia. Exploration of flower structure related to pollination. 14. Dandelion. Arrangement of parts to see individual florets and their stages of growth. 15. Musk (monkey flower) Mimulus sp. Observation of the movement of the lower lobe of a stigma to allow bumble bees to pollinate.

Truly an excellent day, which sent us home with our heads buzzing! Thank you, Roger, and the Committee, for arranging this wonderful day. An extended article about pollination written by Roger is planned for inclusion in Eryngium.

Valerie Oxley

Meeting report Saturday 20th July
Field meeting at Holme Dunes, Norfolk


Looking at the pool in a dune slack with tadpoles of natterjack toad. Photo by Valerie Oxley.

Marching down straight lines of dunes, carved out for a World War 2 military target practice railway, the IAPI party adopts single file as it walks a butterfly transept, all the while ticking off an astonishing number of plant species. And not only plants—there are also 600 recorded species of beetle, not to mention birds, butterflies and moths, Konik ponies and, most specially, natterjack toads at Holme Dunes.
Some 150 years ago Lavender Dunes, in the Holme Dunes managed by the Norfolk Wildlife Trust (NWT), adjacent to the south-east corner of The Wash, was already a developing dune area sheltering saltmarsh behind it. They are unusual in that plentiful bivalve shells have produced calcareous conditions

and a flora that reflects it. In 1953, the sea breached the dunes in the famous floods of that year. This internationally important SSSI is now in a drying-out phase. By a judicious mixture of management, and letting nature take its course, to create high biodiversity, there are now habitats that include mudflats, foreshore, sand dunes, dune slacks, saltmarsh and freshwater marsh. We saw only a part of it. Warden of 30 years, Gary Hibberd led us authoritatively and cheerfully through the various micro-habitats, that make up Lavender Dunes. These are often man-made, such as cutting back the sea-buckthorn but leaving enough shelter for insects; scrapes in the ground to allow the water table to seep through and encourage natterjacks; ponygrazed areas to allow smaller plants to exist such as yellow rattle and scarlet pimpernel; managed yellow oat-grass beloved of butterflies; allowing the spread of common stork's-bill for brown argus butterflies. The plant list below also indicates the number of uncommon species we saw.

Marsh helleborine (*Epipactis palustris*). Photo by Valerie Oxley.

Though primarily an entomologist, Gary knowledgeably pointed out indicator plant species in the context of the history of these now 'grey' or established dunes and the adjacent salt marsh: glaucous grey hair-grass, a pioneer species on older, leached, dunes; marsh pennywort in the dune slacks; pyramidal orchid in dryer upper saltmarsh; common sea-lavender on the lower saltmarsh; annual sea blite on the mudflats; and lyme-grass beside a walkway along the dry crest of the dunes. Many of these plants are food for butterflies and moths. Common ragwort, disliked by the ponies, holds some 150 species of insect; harebell is the only food source of the harebell carpenter bee.

Common sea lavender (*Limonium vulgare*). Photo by Valerie Oxley.

Management produces rich rewards. We heard the natterjacks in their watery slacks (sadly, their larvae a tempting meal for dragonflies). Valerie Oxley spotted the red flowers of hound's-tongue on a much-grazed plant, causing great excitement because other specimens were leaves only. The lesson of climate change was also made by the visible sweeps of thuggish bush-grass (aka wood small-reed). It thrives on increased nitrogen and has to be pulled before it overwhelms the habitat.

Hound's-tongue (*Cynoglossum officinale*). Photo by Valerie Oxley.

For moth-lovers our day ended looking at last night's count. Beautiful hawkmoths will forever remain in this author's mind. Afterwards, those that were left made a foray to the sand dunes where we were met by a most spectacular electric storm making its way towards us from The Wash. The rump of this party beat a retreat to Sandringham for tea—though no sign of that most royal and rare of species, the Queen. Our grateful thanks to Wendy Harvey for organizing this meeting, and to Gary Hibberd for a most informative field day. Sarah Howard

Plants seen or mentioned at Holme next the Sea, Norfolk, 20th July 2019

In alphabetical order of scientific name. Common names mostly as used by Gary Hibberd, with spellings and scientific names from Stace, New Flora of the British Isles, third edition (2010).

Common name	Scientific name	Comments
Yarrow	*Achillea millefolium*	
Agrimony	*Agrimonia eupatoria*	Tall yellow spikes of flowers; when fruits ripe they stick tightly to clothing.
Pyramidal orchid	*Anacamptis pyramidalis*	
Scarlet pimpernel	*Anagallis arvensis*	
False oat-grass	*Arrhenatherum elatius*	Indicative of rich soil, now thinly scattered in the reserve, as wanted.
Sea wormwood	*Artemisia maritima*	Characteristic of dry old saltmarsh.
Asparagus	*Asparagus officinalis*	With larvae of asparagus beetle.
Bush grass, wood small-reed	*Calamagrostis epigejos*	Formerly a rare species but nitrogen pollution in the atmosphere has enriched the soil and encouraged its growth and spread. Managed by pulling flowering stems before seeds are shed, to reduce the seedbank, and by cutting then grazing.
Sea bindweed	*Calystegia soldanella*	Much larger flower than field bindweed, twice the diameter; leaves kidney-shaped. In Stace R.
Clustered bellflower	*Campanula glomerata*	Only a single plant but always appears and never increases; dark blue flowers in inflorescence.
Harebell	*Campanula rotundifolia*	There is a bee species which can only use the flowers of one species of harebell for nectar.
Centaury (common)	*Centaurium erythraea*	
Lesser centaury	*Centaurium pulchellum*	Flowers open in the sun, more intense colour than centaury. Tiny plants.
Rosebay willowherb	*Chamaenerion angustifolium*	
Marsh thistle	*Cirsium palustre*	
Cladonia lichens	*Cladonia species*	Three species, hard to tell apart in the field.
Field bindweed	*Convolvulus arvensis*	
Grey hair-grass	*Corynephorus canescens*	Very rare (RRR in Stace), about 400 tussocks at Holme. Indicator species of old dunes with much leached soil. Formerly found in Breckland where botanists are still looking to refind it.
Hound's-tongue	*Cynoglossum officinale*	Much grazed plant seen in flower; other plants were leaves only.
Early marsh-orchid	*Dactylorhiza incarnata*	Flowering now finished.
Southern marsh-orchid	*Dactylorhiza praetermissa*	
Marsh-orchid (there are several, each with an epithet)	*Dactylorhiza* species	Flowering now finished.
Sea carrot	*Daucus carota* subspecies *gummifer*	In Stace RR.
Viper's-bugloss	*Echium vulgare*	
Marsh helleborine	*Epipactis palustris*	
Common stork's-bill	*Erodium cicutarium*	Became a food plant for brown argus butterfly in 1970s, transferring from *Geranium* species.

Sea spurge	*Euphorbia paralias*	In Stace R.
Lady's bedstraw	*Galium verum*	
Hogweed	*Heracleum sphondylium*	Less on the reserve than might expect; loved by muntjac deer which seek it out.
Sea-buckthorn	*Hippophae rhamnoides*	In Stace RR but much planted outside natural range.
Marsh pennywort	*Hydrocotyle vulgaris*	Indicator species for dune slacks.
Henbane	*Hyoscyamus niger*	In fruit.
Great lettuce	*Lactuca virosa*	
Hare's-tail	*Lagurus ovatus*	In fruit: furry appearance hence the name.
Meadow vetchling	*Lathyrus pratensis*	
Lesser hawkbit	*Leontodon saxatilis*	
Lyme-grass	*Leymus arenarius*	Glaucous leaves. A moth eats it.
Matted sea-lavender	*Limonium bellidifolium*	Very small plant. In Stace RRR, coastal Norfolk and Lincolnshire only.
Rock sea-lavender	*Limonium binervosum*	Aggregate is complex of nine species. Occurs in drier, upper saltmarsh on east coast.
Common sea-lavender	*Limonium vulgare*	Larger, much longer leaves than the other species.
Fairy flax, purging flax	*Linum catharticum*	
Common bird's-foot-trefoil	*Lotus corniculatus*	
Gypsywort	*Lycopus europaeus*	
Red bartsia	*Odontites vernus*	
Parsley water-dropwort	*Oenanthe lachenalii*	
Common restharrow	*Ononis repens*	
Wild parsnip	*Pastinaca sativa* subspecies *sylvestris*	Flowers excellent for insects.
Fox-and-cubs	*Pilosella aurantiaca*	
Mouse-ear-hawkweed	*Pilosella officinarum*	
Silverweed	*Potentilla anserina*	
Selfheal	*Prunella vulgaris*	
Common fleabane	*Pulicaria dysenterica*	Just coming into flower; very important for insects.
Yellow-rattle	*Rhinanthus minor*	Increasing now that the grass has been weakened by tight winter grazing.
Knotted pearlwort	*Sagina nodosa*	Leaves feel like small knobs along stem, hence the knotted.
Sallow	*Salix caprea*, *Salix cinerea*	(Sallow often applied to goat willow and grey willow.)
Brookweed	*Samolus valerandi*	In moist places.
Hoary ragwort	*Senecio erucifolius*	
Common ragwort	*Senecio jacobaea*	Excellent plant for insects, some 150 species associated, including cinnabar moth: plant and moth boom and bust on 7-year cycle.
Sea campion	*Silene uniflora*	
Perennial sowthistle	*Sonchus arvensis*	Yellow glandular hairs all over.
Cord-grass	*Spartina* species	
Greater sea-spurrey	*Spergularia media*	
Annual sea blite	*Suaeda maritima*	Not shrubby, and longer leaves more fleshy than shrubby sea blite.
Shrubby sea blite	*Suaeda vera*	Low shrub, succulent leaves. In Stace RR.
Upright hedge-parsley	*Torilis japonica*	Rough stem.
Goat's-beard	*Tragopogon pratensis*	In fruit, some perfect spheres of fruits, like a larger dandelion clock.
Yellow oat-grass	*Trisetum flavescens*	

Meeting report Saturday 21st September

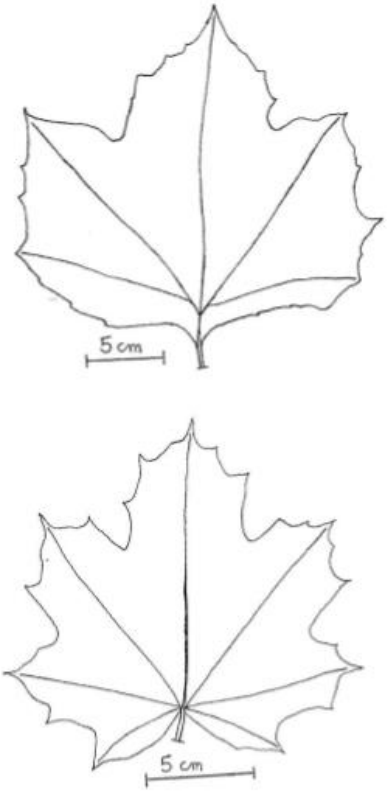
Observing and recording diagnostic features of critical pairs and trios of species

My interest in pairs and trios of species started long ago when I learnt of the two native species of oak, and of the three species of buttercup sometimes found together in grassland. For this meeting I gathered specimens that I could find easily and took a broad view of critical differences, and of pairs and trios. Trees are a convenient source but I included a few herbaceous species. We started with a simple difference that children need to learn, although with familiarity it becomes obvious: beech (Fagus sylvatica) and hornbeam (Carpinus betulus). Each has a general leaf-shaped leaf, so to speak, described more botanically as simple (no leaflets) and ovate (more or less oval), with neat parallel veins either side of the midrib, to the beginner appearing rather similar and nondescript. The key difference is that the beech leaf has a smooth margin (technical term: entire) but the margin in hornbeam is toothed. Beech buds are long—10 mm or so—and stick out from the twig; hornbeam buds are shorter and often lie alongside the twig (adpressed). Of course, if in fruit then beech with its twin triangular seeds in a woody cupule is distinct from hornbeam with its wind dispersed fruits in trilobed wings (bracts). Another simple pair is sycamore and Norway maple, neither native but ancient introductions to the British Isles and related in name (sycamore is Acer pseudoplatanus, i.e. false plane; Norway maple is Acer platanoides, like a plane). Again, the leaf margin is the key difference: sycamore has small, rounded teeth all along the margin whereas Norway maple has a few teeth with long, smooth stretches of margin in between. Jim Egginton (by email) pointed out that it is the smoothly rounded sinus, the hollow between lobes of the leaf, that is really distinctive. Norway maple leaves have a clean-cut appearance, and are flatter and lighter green than sycamore with its slightly textured and leathery leaf, usually dark green. The angle between pairs of fruits is also different: more or less 90° between the wings in sycamore, but much larger although not quite 180° in Norway maple.

Peter Mitchell expounding on palmate leaves. (Photo by Valerie Oxley.)

The classical critical tree pair are pedunculate oak (Quercus robur) and sessile oak (Quercus petraea). The pedunculate and sessile words refer to the acorns: on peduncles, stalks 3–5 cm long with one or two acorns at the end (when the acorn is shed looking like a smoker's pipe), or acorns essentially stalkless (sessile—the older scientific name sessiliflora was more helpful for remembering). The leaves are the other way round with usually a clear leaf stalk (petiole) 8–15 mm long in sessile oak, and a short petiole, a few millimetres only, in pedunculate. The other fairly reliable feature is the auricles—little lobes— at the base of the leaf in pedunculate oak. "Good" robur and petraea are easy to distinguish but hybrids occur and interbreed so that many intermediate forms can be found. A little task that I set was to tell apart palmate leaves of plane trees (we had London plane, Platanus ×vulgaris, and oriental plane, Platanus orientalis) and maples (Acer, a variety of species). When on the shoot it is easy to see that maples have opposite leaves and planes alternate leaves but individual leaves can look rather similar. The trick is to observe carefully how the veins to the lobes of the leaf arise from the tip of the petiole. In maples all the veins to the lobes radiate neatly from a single point. In planes the veins to the lower lobes branch from the veins to the middle lobes of the leaf, and sometimes the radiating point for the central and middle side lobes is a little way into the leaf blade, as illustrated below. Naturally, observant IAPI members soon worked this out at the meeting!

While on palmate leaves, it was fascinating to compare the juvenile leaves of ivy on climbing shoots with the adult leaves on flowering shoots. The juvenile leaves are clearly palmately lobed and palmately veined. The adult leaves are usually more diamond-shaped with veins arranged in a much more pinnate fashion, i.e. branching off either side of a midrib. And there are several examples of palmate leaves, such as tulip tree (Liriodendron tulipifera) and wild service tree (Sorbus torminalis), which have clear pinnate venation. Two introduced species of alder are much planted in streets and, for some reason, supermarket car parks. They are Italian alder (Alnus cordata) and grey alder (Alnus incana). Like almost all alders, the lateral buds are on short stalks and have very few bud scales. Italian alder has leaves that are cordate—heart-shaped—at the base and fruits—alder "cones"—that are 2–3 cm long, much large than grey alder. Grey alder leaves lack the cordate base and are covered with dense short hairs (pubescent) beneath, appearing slightly grey or whitish. Then we come to lime trees. I could not be sure of finding small-leaved lime (Tilia cordata) and largeleaved lime (Tilia platyphyllos), the parents of common lime (Tilia ×europaea) that we see everywhere. Jim Egginton kindly provided the way of telling these apart by the tufts of hairs in the axils of the veins on the lower surface of the leaf: orange in cordata, white in ×europaea and none in platyphyllos (although the midribs and petioles are hairy). Other limes do occur in gardens and as street trees: silver lime (Tilia tomentosa) has whitish underside to the leaf from numerous hairs, and sometimes you can find pendent silver lime 'Petiolaris' with slender petioles longer than half the leaf blade length and consequently fluttery foliage. In Sheffield I had found an unusual lime as a street tree and brought along a specimen. It was readily identified to Tilia by the fruits but had leaves reminiscent of birch. It turned out to be Tilia mongolica on referring to More & White (Cassell's Trees of Britain and Northern Europe, 2003). For cedars, we were able to examine trees in the botanic garden. There are large specimens of Atlas cedar (Cedrus atlantica) and deodar (Cedrus deodara) but curiously not of cedar of Lebanon (Cedrus libani). This is compensated by Cyprus cedar (Cedrus brevifolia), rather rare. On old trees, the alliterative Lebanon level, Atlas ascending, deodar descending can be helpful, for the ends of the branches; deodar also has a leading shoot that leans or droops over. We were able to examine the foliage for the difference in length of needles and numbers in bunches on the spur shoots. Typically, deodar needles at 3–4 cm are notably longer than the other cedars, and Atlas cedar has the most needles on a spur shoot of 40–50, compared with 10–30, but all cedars are rather variable. The Atlas cedar in the garden had abundant male cones shedding vast amounts of pollen.



Leaf outline and main veins of London plane (above) and Norway maple (below). (From Eryngium (2016), volume 12, p. 12.)

Shoot of deodar—note the needles about 4 cm long, mostly in bunches on spur shoots. (Photo by Valerie Oxley.)

Tree pairs and trios were by no means exhausted—think of birches (silver Betula pendula, and downy or white pubescens) or willows with broad leaves (goat Salix caprea, and grey cinerea) or larches (European Larix decidua, and Japanese kaempferi)—but we had one or two herbaceous species to examine. Trefoils have heads of yellow flowers like a miniature clover and I had gathered specimens from two localities: Newcastle upon Tyne (a roadside weed) and Sheffield (in grassland that was occasionally mown). They were fiddly to examine with a lens and in the end I concluded that each was lesser trefoil (Trifolium dubium) with fewer than 25 flowers in a head and not hop trefoil (Trifolium campestre, more than 25 flowers) and clearly not slender or least trefoil (Trifolium micranthum, fewer

than 10 flowers). I wanted to compare smooth and prickly sowthistle (Sonchus oleraceus and asper) but could not find any definite prickly sowthistle. Sometimes leaves of smooth sowthistle look rather spiny but the critical point seems to be the auricles which are curled around and close to the stem in prickly sowthistle. Hybrids can occur, according to Stace (New Flora of the British Isles, 2010) but rarely and are sterile so that the two species should remain distinct. Many more critical pairs and trios remain to be examined, for example the species of Vaccinium (bilberry and the like), those shrubs with opposite leaves (dogwood, buckthorn), the two species of hawthorn, of nettle, or dog's mercury, of reedmace. Then there are the three scabiouses, gorses, bindweeds, and so on. Another meeting on this topic could be held in future, preferably in late spring or summer, especially if members were able to contribute requested species to make pairs and trios. Peter Mitchell

Meeting report Saturday 16th November

Digital imaging: new opportunities from the latest technology, with Anne and John Bebbington

John demonstrating how he uses the computer in producing his images.

John, a zoologist, and Anne, a botanist, worked together for the FSC as Ecology Tutors for over 30 years. On retirement they continued to do so but also spent more time developing their other interests: John, photography; and Anne, botanical illustration. Their current project is studying how insect behaviour relates to flower form and structure. They have chosen as an example to focus mainly on the snapdragon, Antirrhinum majus, to demonstrate how art and photography can work together. There are three aims: (1) to illustrate the flower; (2) to photograph the flower; and (3) to show how the flower is pollinated. In the morning session they delivered a PowerPoint presentation that showed the processes they go through in order to collect the information. In the afternoon session we were split into two groups, with Anne demonstrating the dissection of the Alstroemeria flower, and John demonstrating scanning and the photography processes, along with details of the computer programs he uses. We swapped over mid-afternoon and there was an opportunity to try things out and share ideas.

Anne explained that before she even before she started to dissect the flower she would study it for up to two weeks and go to the literature to research everything about it. She carefully dissects it and records every stage; the half flower that is left contains a lot of information.

In order to get an image of the half flower, it can be scanned by putting a small black box over the flower. This gives a very respectable image. An image could also be taken on a tablet or phone which can be just as good, but you do need to work out the light source. If you are painting the flower, make sure you match the colour to the flower and not the photograph or scan.

Scanning using a small box over a flower.

Anne demonstrating the dissection of a flower.

Anne's paintings include a field sketch, details of the half flower, detail of the ovary and a front view of the flower. The images were beautifully executed. John described how he achieves the photographs of the pollinators,

describing how you need to walk quietly, sit next to the plant and wear subtle clothing. You also need a lot of patience to get the ideal photograph. The images are then put onto the computer and specialized programs used to produce the perfect image. The process of achieving the perfect image was very detailed. Details of the process and equipment that he described and demonstrated later in the afternoon can be found in John's book, Insect Photography, Art and Techniques. John and Anne are two very knowledgeable and talented people. Their talk and demonstration were excellent and we all went away having learnt a lot and inspired to improve our own work and try out some of the techniques.

Thank you for a superb day. Wendy Harvey