POLLINIA

NEWSLETTER OF THE IRISH ORCHID SOCIETY

Cumann Magairlíní na hÉireann

Volume 16, Issue Two

THE IRISH ORCHID SOCIETY
OFFICERS & COMMITTEE

Marie Hourigan (Chairperson)
Mary Bradshaw (Treasurer)
Carmel Higgins (Secretary)
Laurence T. May (Editor)

Committee:

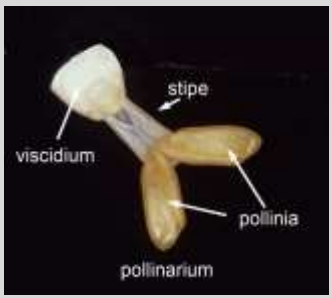
Marina Andreeva
Lisa Coffey
Aleksandra Kucharczyk
Laurence T. May

POLLINIA
(pol-LIN-ee-uh)

The compact packets of pollen found in orchid flowers. The plural of *Pollinium.*

Waxy pollen clumps or grains usually found in the anthers of most orchids; often yellow, distinct, and found under the pollen cap of the column.

Pollinia contain the male reproductive cells. Latin *pollin-*, stem of pollen "fine flour, dust."



Orchid Pollinia

MEMBERSHIP DETAILS

ANNUAL SUBSCRIPTION]

Adult Single	€20.00
Family	€30.00
OAP/Student*	€15.00

*Confirmation of student status required

Please make cheques or PO payable to: **The Secretary, Irish Orchid Society**
Payments may be made by Credit Card and by PayPal on our website. Members and friends may also donate in support of the Society's educational activities and ***Pollinia***. Please contact the Editor for information on advertising.

Applications, questions about membership and other Society communications should be made to:
Hon. Secretary
The Irish Orchid Society
c/o National Botanic Gardens
Botanic Road, Dublin, D09 E7F2, Ireland

EDITORIAL INFORMATION

The Editorial Staff reserve the right to edit and/or amend articles submitted to the Newsletter.

The views or comments published within this Newsletter are not necessarily views shared by either the Editorial Staff or the Irish Orchid Society.

Contributions of articles, photos or comments may be sent by email to:
The Editor - ios.pollinia@gmail.com
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Copies of this and previous issues (in pdf format) are available at:
www.pollinia.org
Print copies may be ordered. Please contact the Editor.

Cumann Magairlíní na hÉireann

IOS & OTHER ORCHID EVENTS, FAIRS, MEETINGS, SHOWS, CONFERENCES

All talks are held in the Visitors Centre of the National Botanic Gardens, Glasnevin, and begin at 7:30pm, unless otherwise stated. Please check the IOS website for possible changes.

OCT 1 2018

MEMBERS' NIGHT

Monday October 1st, 2018, 7:30pm

"Lesser Known Orchids Revisited"

Brendan Sayers will revisit a lecture given by F.W. Moore to the Royal Horticultural Society in 1908.

NOV 5 2018

MEMBERS' NIGHT

Monday November 5th, 2018, 7:30pm

"10 Success Secrets for the Orchid Hobbyist"

Shane Kerr will explain the routes to both his mistakes and triumphs as a grower of 36 years experience distilled into 10 valuable lessons for everyone.

DEC 3 2018

CHRISTMAS PARTY

Monday December 3th, 2018, 7:30pm

Test your orchid knowledge with Brendan Sayers' Orchid Quiz, along with a few nibbles and light refreshments! As with all meetings, bring along any orchids you'd like to show your fellow members. A Happy Christmas to all IOS members and family.

CHRISTMAS AT KEW 2018

Thursday 22 November 2018 – Saturday 5 January 2019.

www.kew.org/

2019

JAN 1 2019

JANUARY

No Meeting

Athbhliain faoi shéan is faoi mhaise daoibh.
Happy New Year!

FEB 4 2019

MEMBERS' NIGHT

Monday February 4th, 2019, 7:30pm

Potting demonstration

MAR 4 2019

MEMBERS' NIGHT

Monday March 4th, 2019, 7:30pm

Details to be finalised

APR ? 2019

ANNUAL ORCHID FAIR

Annual Orchid Fair in The National Botanic Gardens - **Dates to be confirmed**

This is the premier annual orchid event in Ireland with a large selection of species and hybrids for sale. See website for dates.

MAY 13 2019

MEMBERS' NIGHT

Monday May 13th, 7.30pm

Details to be finalised

JUN 10 2019

ANNUAL GENERAL MEETING

Monday June 10th, 7.30pm

The traditional 'State of the Society Address' will be given with the Committee putting forward ideas to advance the Society in the year ahead. It is also the forum for members to give their feedback and suggestions.

Taichung, Taiwan, March 29, 2020

FROM THE EDITOR - LAURENCE MAY

MEMBERS SUBSCRIPTION REMINDER Members are reminded that the Membership year now begins on the date a member joins the Society. Annual Subscriptions are now due for 2019-2020. Subscription payments per the schedule on page two are to be posted to: Secretary, The Irish Orchid Society c/o National Botanic Gardens, Dublin, D09 E7F2. If you prefer, you may use the Credit Card/PayPal form at our website: www.irishorchidsociety.org/membership.php

By now all members should be aware that our website, beautifully designed and administered by our Committee Member Lisa Coffey., has been extensively 'remodeled' and now ranks as one of the tops in Ireland. If you haven't yet, please visit and appreciate her design, skill and architecture. www.irishorchidsociety.org/

Thanks to all of you who have sent us images of your plants, especially Phillipa Thomas. The photos in this issue of orchids at the EEOCE in Paris are by Mary Bradshaw. The photos of the Orchid Fair and RHS are by Marie Hourigan and Phillipa Thomas.

The Treasurer received an additional €120 for advertising in **Pollinia,** but too late for inclusion in the AGM Report. Advertising and sponsorship have the potential to be extremely helpful to the Society, especially towards continuing the publication of **Pollinia**. The increased costs of printing and of post have caused serious lacunae in our funds. The Committee is considering several alternatives among which is having **Pollinia** become an Annual publication. I would note here that after ten years as your Editor I am considering retiring and having another Member take over. I'm sure there are many people with better design abilities, fresh ideas and mort interesting content management. Please contact the Secretary or Chairperson if you are interested.

There are over 370 species of spiders in Ireland, but only 26 species of ants.

Front Cover: *Caladenia procera,* terrestrial, perennial, deciduous, herb with an underground tuber and which occurs as single plants or in small clumps. It has a single erect, pale green, hairy leaf, 200–450 mm (8–20 in) long and 6–14 mm (0.2–0.6 in) wide. Up to four greenish-yellow and red flowers 100–140 mm (4–6 in) long, 80–100 mm (3–4 in) wide are borne on a stalk 350–900 mm (10–40 in) tall. The sepals have thick, yellowish-brown, club-like glandular ends 15–25 mm (0.6–1 in) long. More details may be found on the Native Orchid Society of South Australian website (nossa.org.au)

Rear Cover: *Oncidium flexu*osum. The Editor's favourite orchid genus. The Bent Oncidium is native to Para, Pernambuco, Alagoas, Bahia, Espirito Santo, Minas Gerais, Rio de Janiero, Sao Paulo, Parana, Santa Catariana and Rio Grande do Sul states of Brazil, Argentina, Uruguay and Paraguay. This species is a small to medium sized, cool to hot growing, epiphytic orchid that reaching 13-30 cm. These plants grow by climbing, and has narrowly ovoid or ovate-elliptic, compressed, ancipitous pseudobulbs (3.8-7.5 cm tall) carrying 2 apical, spreading, slightly coriaceous, narrowly oblong-ligulate, obtuse or abruptly acute leaves. A large number of thin roots grow from the rhizome and from the base. The leaves are 10-23 cm long, ribbon, shiny, pointed.

THE IRISH ORCHID SOCIETY

2018
ANNUAL GENERAL MEETING

MINUTES

DUBLIN
11 JUNE 2018

THE IRISH ORCHID SOCIETY

MINUTES OF THE IOS ANNUAL GENERAL MEETING 11 JUNE 2018

Apologies: Úna Breathneach, Marina Andreva, Mairead Donnelly, Tom Doran, Laurence May

The Meeting Agenda opened at 7.30pm with the Minutes of the 2017 Annual General Meeting, read by Brendan Sayers, Chairperson.

These were proposed as a true account by Scott McNaughton and seconded by Olwyn Lanigan.

Treasurer's Report
The Treasurer's Report was read and explained by Treasurer Mary Bradshaw, proposed by Shane Kerr and seconded by Marie Hourigan.

Website
A new design for our website was introduced by Lisa Coffey who put a huge amount of work into it and made it more 'user friendly.' Also, Membership now will run from the date of becoming a member rather than from July 1st to the following June 30th. Lisa hopes that more members will contribute to the website with interesting snippets about their orchids.

Highlights for 2017-2018
The highlight of the year was the unprecedented visit from London of the Royal Horticultural Society's Orchid Committee.

Their visit, which was open to the public, focused on judging orchids . The meeting gave a great opportunity to see and listen to experts in action and was considered a very special and most interesting event. Ten orchids were judged with those being awarded described in the next issue of ***Pollinia.***

In conjunction with the visit was the exhibition titled 'Three Threads' and the Dublin Orchid Show. Throughout the weekend, the gallery in the Visitor Centre at the National Botanic Gardens showcased the Orchid House and material from the archives. Paintings by botanical artists, Margareta Pertle and Deborah Lambkin also formed part of the exhibition. Talks and tours of the exhibition took place over the weekend.. Burnham Nurseries had, as usual, the most exquisite orchids for visitors to the exhibition to buy and were the only retailers as Ray Creek has retired.

This year we had more entries to show from our members at the weekend. The overall winner was Tom Doran, a popular choice as at most of our meetings Tom brings in something to show and talk about sharing his knowledge on how he grows them. They are usually very impressive and beautiful. At the Annual General Meeting Tom was presented (*in absentia*) with The Myra Best perpetual salver which was donated to the Society by Myra's sister Laurie. Some illustrious names of those who won Best in Show since 2004 are inscribed on the salver. They include the late Anne Doyle, Phillipa Thomas, Mairead Donnelly, Mark Garvey, who has won it three times, and of course our own Brendan Sayers. A full list of awards to Irish Orchid Society members for 2018 is given at the end of the Minutes.

Thanks
Bob Bradshaw thanked the Botanic Gardens for the use of the buildings and the hospitality afforded to the RHS visitors whilst there.

Brendan thanked Laurence May editor of ***Pollinia*** for the magnificent work he does and especially for the Special Edition for the RHS visit. Brendan also congratulated Committee member Marina Andreeva who won a Gold Medal for her joint garden design at Bloom this year. He also thanked his committee for the work they have done for the Society.

Stepping down from office, Brendan was delighted to introduce our new Chairperson, Marie Hourigan who has done Trojan work for the Society over the years. He complimented her work on Three Threads and for assistance with the Special Edition of ***Pollinia***.

Brendan suggested we should ask the new chair to organise workshops which has been asked about on numerous occasions. Also to give ideas to the Committee if one doesn't want to be on Committee.

Carmel Higgins suggested we should have our own message cards for sale at the Dublin Orchid Fair weekend, we have no shortage of superb photos taken by Phillipa Thomas and it would be another earner for the Society as well as the raffle which this year took in €498.

Most importantly we have to get public liability insurance cover for field trips and this should be given top priority.

Everyone thanked Brendan for his superb input to the Society and wished him well.

The final meeting for this year will take place on Bull Island at 6.30pm, 21st June 2018.

The next meeting will be September 3rd in the National Botanic Gardens.

The meeting was then closed.

Chairperson's Report
As I prepare my report for the Annual General Meeting I look back at the one previously written and delivered. When I look at the 2017 report I see where we have failed to deliver or organise but mostly I see what we have achieved. The Irish Orchid Society year of June 2017 to June 2018 has been one of unprecedented achievement especially in the work carried out with the National Botanic Gardens, Glasnevin.

So let me start with the highlight, The visit of the Royal Horticultural Society's Orchid Committee to the National Botanic Gardens during the Dublin Orchid Fair 2018. The weekend of April 21 and 22 bathed the Gardens in sunshine, a reverse to what we expected given the late and cold spring we experienced. Burnham Orchids were the sole exhibitor due to the retirement of Ray Creek and they did an impressive job of making the Teak House look spectacular. The exhibition Three Threads was in the final days of showing and visitors were able to take a look at some of the archival material from the Library collections compiled primarily by Marie Hourigan, along with paintings by botanical artists Margareta Pertl and Deborah Lambkin. Margareta's work depicted the orchids named after Frederick William Moore and a limited-edition folio of prints and accompanying text is available for sale.

The Royal Horticultural Society's Orchid Committee were officially welcomed to Glasnevin by the Commissioner of the Office of Public Works, John McMahon on the Friday evening prior to the talk by the Orchid Committee's Chairperson, Clare Hermans. This event was organised by the Irish Society of Botanical Artists.

On Saturday the RHS Orchid Committee were given a tour of the Library and living collections by Brendan Sayers, Marie Hourigan and Alexandra Caccamo and then held their public meeting in the meeting room at the rear of Richard Turner's magnificently designed Curvilinear Range. Ten plants were put forward for judging and four were fortunate to be awarded. Two *Miltoniopsis* from the Eric Young Orchid Foundation received Awards of Merit; a Certificate of Cultural Commendation was awarded to Burnham Nurseries for their plant of *Maxillaria variabilis*. An unregistered hybrid cross (*Zygodisanthus*) of *Paradisanthus bahiensis* x *Zygopetalum* Kiwi Magic, with the cultivar name of Emerald Isle, shown by Michael Tibbs, received a Preliminary Certificate subject to being registered within the next 6 months.

The Special Edition of ***Pollinia*** was very well received and the content reflected heavily on the Society and Irish orchids both native and non-native. We must thank Charles Nelson, Clare and Johan Hermans, the IOS Chairmen, Mary Bradshaw, Deirdre McGrane, Lisa Coffey, Margareta Pertl and Brendan Sayers for the content along with re-prints of articles by Johan Hermans and the late Brian Rittershausen, but most especially Larry May who worked tirelessly to bring it all together for the Dublin Orchid Fair weekend.

The **IOS Members Show** also took place and congratulations to all who own and grew the following. Some stunning Orchids of members who won awards were outdoor one, miniatures, Cymbidiums and others.

Best in Show - *Gomesa echinata* - Tom Doran
Best Species - *Gomesa echinata* - Tom Doran
Best Hardy Orchid - *Pleione* Berapi - Shane Kerr
Best Hybrid - *Odontioda* 'Sunset' - Phillipa Thomas
Best Miniature - *Scaphosepalum* sp. - Phillipa Thomas
Best Cattleya - *Potinara* 'Little Toshie' - Massimiliano Mascherini
Best Phalaenopsis - *Phalaenopsis* hybrid - Carmel Higgins

SECRETARY
IRISH ORCHID SOCIETY

Financial Statement – Irish Orchid Society – 2017 / 2018

Income

Subscriptions	€725.00
Life Members	0.00
Raffles	911.00
Sales of Bark	28.00
Advertising receipts	0.00
Potting Demonstration	0.00
Sales to date of **Pollinia: Special Edition**	75.00
Total	**€1,739.00**

Expenditure

Pollinia	935.36
Web Site costs and advertising banner	225.45
Prizes for Raffles	103.00
European Orchid Council membership	0.00
Envelopes	0.00
Stamps	383.15
Orchid Society of G.B. subscription	31.50
Bank fees	81.45
Speaker expenses	205.00
Bark	80.00
Pollinia: Special Edition	897.00
Engraving of tray	55.00
Total	**€2,996.91**

Deficit €1,257.91

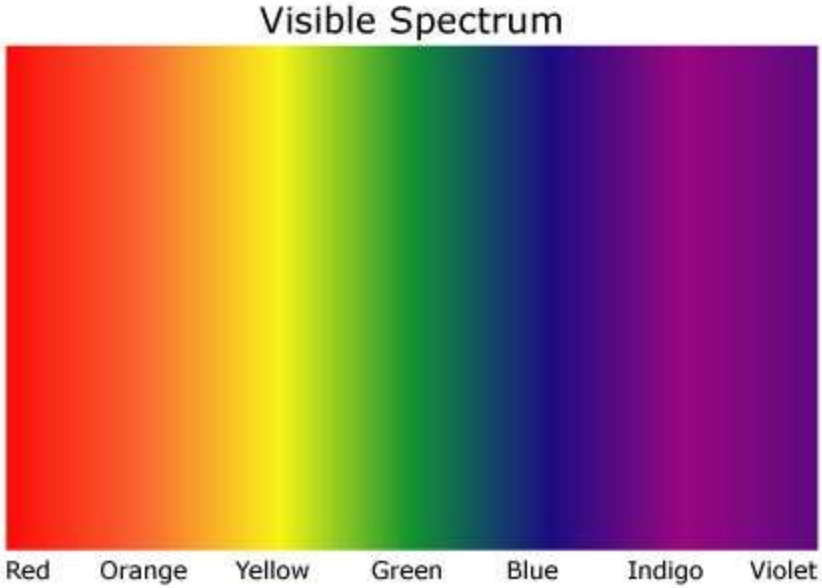
Cash at Bank, in two accounts, €5,631.46

MARY BRADSHAW, TREASURER

Q: Why are plants green?

Liam O'Sé, Kilglas

A: There is currently no complete answer available for this question, however, here follow the basics of what is known. Plants are coloured because they contain pigments that absorb certain colours of light more than others. The picture below shows the spectrum of visible light:



Above: the spectrum of visible light

Visible light is that part of the electromagnetic (EM) spectrum which humans can see with the naked eye. However, the EM spectrum extends far to the left and right of the visible light spectrum, for example, moving to the right of violet we encounter ultraviolet radiation, then X-rays and then gamma-rays. Moving to the left we encounter infrared radiation, then radio waves and then microwaves. All these forms of electromagnetic radiation, from microwaves to visible light to gamma-rays are waves of electrical and magnetic energy. These waves travel at the tremendous speed of light across a vacuum (such as outer space) which is about 3 00 000 kilometres per second! (No massive object and no signal can travel faster than light under normal circumstances).

The term 'light' strictly applies to that EM radiation that can be seen by the naked eye, but often scientists refer to the whole spectrum of radiation as light and that part that can be seen as 'visible light'.

Some animals can see infrared and/or ultraviolet light also, goldfish fore example can see visible light, infrared and ultraviolet. Many insects can see ultraviolet, but cannot see red light at all well. Infrared light is radiated by warm objects and so at night objects are still clearly detectable in infrared light as they cool off. This is why the military use infrared night scopes and why moths can see infrared.

When you look at an object, you see light that is either emitted by the object, if it is hot and luminous, or light that is reflected or transmitted by it. For example, a hot coal emits orange-red light, but red glass transmits (lets through) red light whilst a green apple reflects green light (whilst absorbing the rest). The leaves of plants look green because their pigments absorb red and blue light and transmit and reflect green light.

This explains what makes plants look green, but does not tell us why they are green?

Plants absorb light and use the energy of the light to make complex organic chemicals - fuels like sugar and building blocks like proteins, from carbon dioxide and water and minerals like nitrogen. The sunlight they absorb provide them with the 'solar power' they need to make these chemicals and build their bodies. This process of using energy from sunlight to build bodies is called photosynthesis.

The graph below shows the relative amount of each colour in sunlight and the relative amount of each colour used by a typical green plant in photosynthesis. The colour of visible light is shown in the spectrum at the top, but is also given on the horizontal axis as wavelength in nanometres (with visible light extending from about 350 nm to 750 nanometres; one nanometre, 1 nm, is one billionth of a metre). Light is made up of particles called photons. Plants work by using their pigments to absorb these photons and capture their energy. Thus it is the number of photons absorbed that matter to the plant. Hence the vertical scale is given as the relative photon flux density. Photon density simply means the number of photons striking each unit of area (say each square inch) of leaf surface. The flux part tells us we are measuring the number of photons per second, so we are now measuring the number of photons hitting each square inch of leaf surface per second. 'Relative' means that we are not bothered by the actual numbers at present (only the shape of the graph) and so have rescaled the vertical axis, giving the highest value 1 and the lowest zero. Thus, this graph shows us the relative number of photons striking each square inch of leaf surface per second for each colour (wavelength) of light - this is the 'sunlight' curve. The 'photosynthesis' curve is the proportion of these photons hitting the leaf that are absorbed and used in photosynthesis (1 means they are all absorbed, zero means none are absorbed) for each colour (wavelength) of light.

Notice that sunlight peaks at about 600 nm, which is yellow light - there is more yellow light in sunlight than any other colour because the Sun is a yellow star! Much of the Sun's light below about 300 nm (ultraviolet) is absorbed by the ozone layer, which is just as well, since this light is damaging to living things, so plants don't use this energy! Wavelengths above 750 nm correspond to infrared light and beyond. Green plants do not utilise this infrared light directly for photosynthesis, but purple bacteria do. The two peak colours absorbed by plants for photosynthesis, are around 450 nm or blue light and 670 nm or red light. Notice that green and yellow light are not absorbed as well and so the graph here dips.

Can you see why plants are green?

Plants are green because they absorb almost all of the blue and red light and transmit and reflect almost half of the green light and the yellow light and so their leaves appear yellow-green. Again this tells us how the green colour comes about, but it doesn't really tell us why.

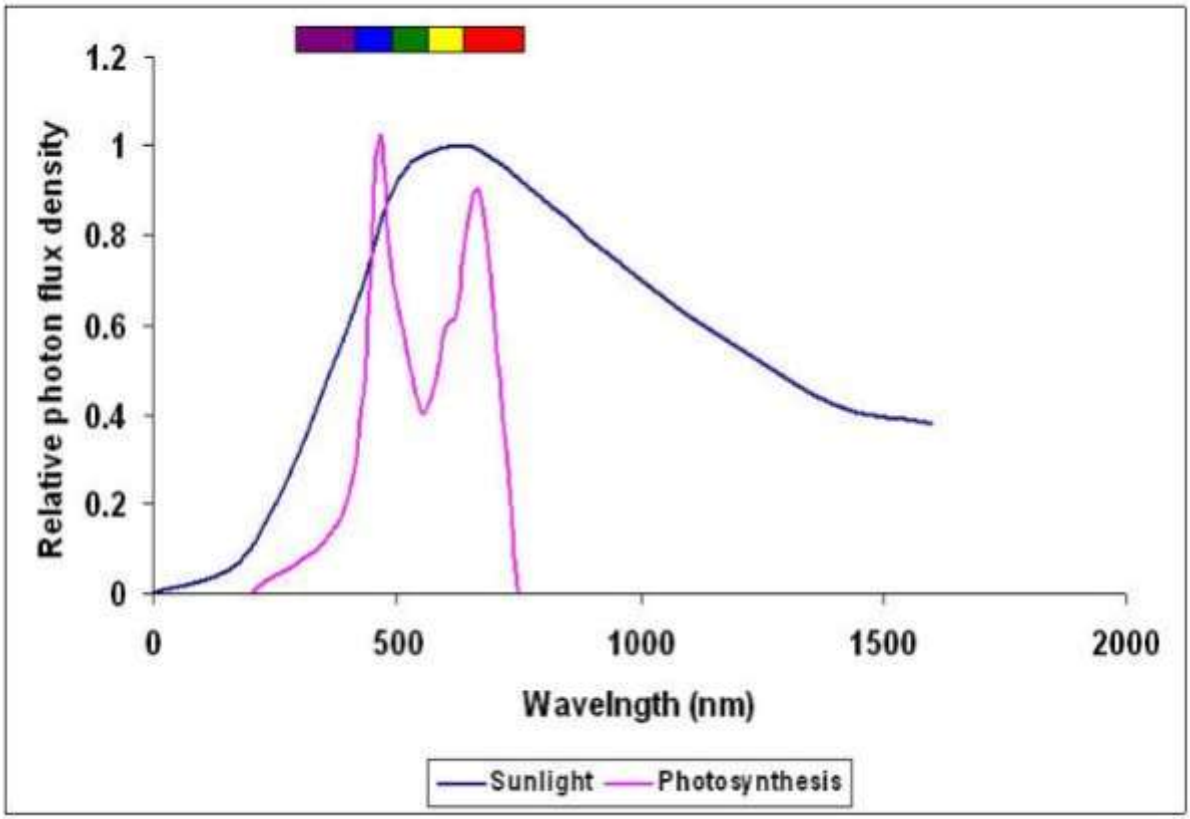
***Here is the paradox*:**

Why don't plants absorb all the green and yellow light (which would make them appear more or less black) since then they will extract more energy from the sunlight?

First, you need to understand that photons with a longer wavelength, that is toward the right or red-end of the graph have less energy than photons toward the left or blue-end of the graph - blue light photons are more energetic than red-light photons. This might explain why plants don't bother with the infrared light - it is low in energy. Absorbing the blue light makes sense since this is high in energy. However, although a blue photon with a wavelength of 450 nm has about 20% more energy than a yellow-green photon with a wavelength of 550 nm, there are about 30% more yellow-green photons available than blue ones (at the given wavelengths). Scientists have tried to explain the lack of green absorption by energy arguments, but these arguments thus appear to be invalid!
So why don't plants use the green or yellow light?

Is there <u>really a paradox?</u>

It should be noted that plants do in fact utilise around 50% of the green and yellow light, so they are not wasting it. Furthermore, the green and yellow light which is not used and passes through the leaf may well be absorbed by a leaf lower down in the canopy - trees tend to have layers of leaves arranged to absorb as much of the light as is economical. In other words, plants don't waste the green and yellow light at all, they use it! However, why don't they absorb it as efficiently as blue and red light? Why do they rely on layers of leaves to do what a good green-light absorbing pigment will do in fewer leaf layers?



Relic of evolution?

Green plants evolved from green algae that lived in the sea. Algae are not plants, but belong to the protoctistans, but they are close to the ancestral form of plants. Not all algae are green. Water is blue in part because red light is readily absorbed by water, such that very little red light penetrates to depths greater than 20 metres, so water transmits blue light better than red light (the sea also reflects blue light from the blue sky overhead, adding to its blue colour). Algae living at greater depths tend to look red in sunlight, since they lack pigments that absorb red light and so they reflect and transmit red light well. It would be a waste of their resources making such pigments when they have no red light to absorb! Green algae live in shallower water where there is plenty of red light to be used, and so they absorb this light. They also absorb the ample blue light that is available. However, organisms that float in the water, such as microscopic algae and photosynthetic bacteria, absorb much of the light before it reaches the green algae.

It has been suggested that these bacteria absorb much of the green light, but not the blue, leaving more blue light and less green light available to the green algae. If this is so, then the green algae will have evolved to utilise the wavelengths of light remaining - principally blue and red. There is some truth in this, since cyanobacteria are among the most abundant photosynthetic bacteria in plankton, and they are blue-green, so they don't appear to use the blue light as well as green algae. However, then one has to explain why the cyanobacteria did not evolve to use all the blue light! If red algae had colonised land, would they have turned green? It was always more likely that the greens would make it since they were already adapted to shallower water.

It seems to me, that evolving suitable pigments may be difficult. The cyanobacteria evolved first, and used what pigments they had. Other organisms then had to make use of what colours of light were left. Green plants would then be green more by accident than design - it is perhaps a relic of their evolution. So, why didn't they change colour once they got on land - maybe because it is difficult to evolve suitable pigments, or perhaps because they don't to, maybe using a multi layered canopy works just fine! On the other hand, what is often overlooked, is that many probably have!

Not all 'green' plants are green.

A recent research article attempted to explain why plants on Earth are green and to predict the colour of plants on other planets with different colour suns. They concluded that blue vegetation is unlikely, because blue light photons are energetic and tapping that energy is useful. However, cyanobacteria that dominated the Earth for aeons are blue-green and many plants on Earth are blue!! Do an image search on Google for 'blue plant' and see what you find! The copper beach is predominantly reddish in colour as it contains many red pigments (which are photosynthetically active).

Should plants be black?

Some plants are almost black, which shows that they do a good job of absorbing all colours of light. Accessory pigments absorb green and yellow light and pass the energy on to the chlorophyll. The fact is, that some colour will be absorbed less well than the others, by however little, and this will colour the plant. Thus it seems to me, that the question of why plants are green has no answer explainable by functional mechanisms - it is simply an evolutionary relic that is probably of little consequence to the plant and is probably largely unavoidable, since plants must be some colour if not black! Maybe reflecting some light stops the plants from overheating - black objects get warmer in the sunlight! Plants go through considerable lengths to stop their 'solar panels; overheating.

This is the best answer I have so far obtained.

Although it is true that green is in the 'middle' of the spectrum, and so best placed to absorb the spectrum either side, this is still not the whole story. ('Middle' meaning that part of the Solar spectrum that easily passes through the atmosphere. Also 'middle' in the sense that if the energy is too far to the red-end then it has less energy per quantum and if too far towards the ultraviolet actually starts to damage molecules since it contains too much energy per quantum).

First of all, plants still fail to utilise some photosynthetically useful light, which can be used by other organisms. Perhaps the question shouldn't be 'Why are plants green?' but 'Why aren't plants black?' Perhaps being black would require too many pigments to simultaneously evolve, or perhaps utilising all these pigments would be too costly and the plant would encounter diminishing returns. Copper beech trees are red, sometimes almost black, because they have additional pigments that absorb the useful blue light for photosynthesis. Why haven't the majority of plants evolved to do this? True all have red pigments that absorb some of the useful blue light, but in most the green pigment still dominates - why? What additional costs does the copper beech incur by absorbing blue light so well? Perhaps if plants were black they would absorb too much light and overheat? The fact that some land plants are blue, some red, some almost black and most green tells us that there are additional factors at play.

Evidently green is the best bet, on Earth, if one colour had to be chosen, so most terrestrial plants are green, but I still don't know why so few plants are black. Another question that comes to mind is 'How evenly must a plant absorb the visible wavelengths to appear black to the human eye?' Certainly the amount of useful light that plants let slip appears quite significant in many cases. In the end it probably comes down to economic issues - plants have to balance costs and benefits, being 'optimal' may actually be sub-optimal if the plant incurs too many costs, for example in pigment production - perhaps being black is just too expensive for what its worth.

HTTP://CRONODON.COM/

THE GREEN-FLOWERED HELLEBORINE IS AN UNPREDICTABLE ORCHID

While so much of Ireland's native flora and fauna is in trouble, it is heartening to hear of new populations of rare species. The green-flowered helleborine, in bloom now, is a very scarce and easily missed orchid, thanks to those vegetation-toned, green flowers. The second part of its botanical name, *Epipactis phyllanthes*, means leaf-flowered.

Until relatively recently, this self-effacing orchid was thought to exist in Ireland as just a handful of plants in a handful of places. In 2015, however, Father Jackie O'Connell, an amateur botanist, found a new population of some hundreds in Co Kildare — the largest number recorded in Ireland or Britain.

The find was confirmed by Brendan Sayers, the National Botanic Gardens orchid expert, and is being monitored regularly. The numbers have fluctuated over the years, but the species is notoriously unpredictable, disappearing from one site and popping up in another.

THE TIMES (LONDON)

From Two Mile House, in Co Kildare, John O'Connell adds: "You may be aware of a similar botanical story to that of blue-eyes grass. Irish lady's tresses – *Spiranthes romanzoffiana*, had its first home in North America."

18TH EUROPEAN ORCHID COUNCIL CONFERENCE AND EXHIBITION

The inactivities of the French transport unions and air traffic control restrictions notwithstanding, we made it to the Paris Event Centre by Friday 23rd March. In a bleak shed in outer Paris about sixty stands were being set up, some with superb presentation, and there was an opportunity to purchase plants, accessories, books, botanical art, photographs, show souvenirs etc. Also, sixty two academic posters were being hung in preparation for judging on Saturday. Despite the ongoing transport chaos, visitor attendance and plant sales were rather better than might have been expected by the volunteer organisers. We had a very good look at the plants on offer and decided to purchase on Saturday or Sunday.

The usual European traders were in attendance: La Cour des Orchidees (France), Les Orchidees de Michel Vacherot, (France), Akerne Orchids, (Belgium). Also, Hui Yun Orchids,(Taiwan), Orquideas Amazonicas, (Peru), Orquideas Katia, (Columbia). The only British exhibit was from Writhlington School, a superb exhibit which won more 1st prizes and Best in Class awards than any other society, trader or institution. Also notable was a magnificent display of Cymbidium flower spikes from the Eric Young Orchid Foundation (Jersey) which was outside competition.

On Saturday March 24th we attended the first set of lectures on "*Conservation and Restoration in a changing world.*" I will just mention a few points regarding some of these which our readers might find interesting. All the lectures were short, 20 minutes, with time for one or two questions. The lecture programme ran very well to time but there was some noise intrusion from the display hall.

"*Conservation status, reproduction biology and restoration needs of the European emblematic orchid*" - Tiiu Kull, Estonia

The orchid in question was *Cypripedium calceolus*. Listed as threatened in most national Red Lists in Europe, it has become extinct in some countries. The usual reasons are given, habitat destruction, inappropriate forest management, overgrazing and undergrazing. Population size is small with low fruit set, many of the seeds are non-viable and thus seedlings are rare. During the last decades the species has been successfully propagated asymbiotically with restoration in twelve sites in Britain. It was suggested that many parks and woods could plant *C. calceolus* to enlarge the populations with better possibilities for crossing.

"*Species distribution models and their application to orchid biodiversity research*" - Paul Kinlemann, Czech Republic

SDMs are numerical tools that combine observations of species occurence or abundance with environmental estimates and can be used to suggest areas unexplored, or little surveyed, which may contain plants or be suitable for reintroductions. Model realism and robustness is influenced by selection of relevant predictors such as climatic variables, geological substrata, slope and orientation of the ground. For areas not fully explored, e.g. parts of Columbia, this may be useful in suggesting areas worthy of special protection.

"*Tree removal as a management strategy for the Lady's slipper orchid*" - Sonia Hurskainen, Finland

Cypripedium calceolus grows as an understory plant in conifer and herb-rich forests where the dominance of spruce often decreases light availability. Selective tree removal was studied as pollinators are known to prefer open sites. It was found that tree removal had no effect on dormancy or flower density, there was a lagged but long-lasting result on shoot density over 15 years but further management is needed to improve seed germination.

"The ongoing story of Ambodiriana forest in Madagascar, a representative study of in situ conservation"- Jean-Michel Hervouet and Chantal Misandeau, France.

The Ambodiriana forest on the east coast of Madagascar is a small area of 240 hectares with at least 100 species of wild orchids. Some of them are considered endangered or critically endangered. Some are new to science. For 15 years since 1999 eco-tourism

was developed with a team of guides and bungalows built in a camp. Regular surveys by botanists and zoologists revealed the exceptional value of the forest which has a very specific habitat, due to three waterfalls that maintain a high humidity level. All this fell apart when the ADEFA agreement lapsed, cyclone Enawo hit the region and the camp owners wanted to recover their land, burn it and sow rice.

A new agreement is being put together, an orchid species *Bulbophyllum septatum* which may be new to the area has been identified and a new status for Ambodiriana will hopefully be achieved.

"*A synthesis of recent trends in Platanthera systematics in Western Europe*" Daniel Tyteca and Fabiana Esposito, Belgium.

Recent research in Western Europe has shed new light on the structure of sympatric (occurring in the same geographical area) populations of *Platanthera bifolia* and *P.chlorantha*, both of which orchids we are familiar with in Ireland. There appear to be intermediate individuals between these two plants and also some populations made up exclusively of such intermediates. Based on morphological, molecular and chemical arguments, it was demonstrated that most so-called "intermediates" are in fact *P. bifolia*. True hybrids between the two species seem to be very rare.

Morphometric, molecular, chemical, mycorrhizal, pollinator and soil analyses were conducted in Belgium. The conclusions were that there are two independent taxa within *P. bifolia*. This name should be restricted to allopatric (geographically separate) populations growing on acid soil, in open areas with fresh to marshy conditions. *P. bifolia* populations, often growing on basic soil in semi-open to shaded habitats should be given the name *P. fornicata*. Further molecular analysis is needed.

I hope this gives members a flavour of the conference. The 23rd World Orchid Congress will take place in Taiwan in March 2020. The 19th European Orchid Council, Conference and Exhibition will be in Copenhagen, Denmark on May 6 - 9, 2021.

MARY BRADSHAW

COUNTY ANTRIM: SIXTY RARE ORCHIDS POP UP IN SCHOOL MEADOW

More than 60 rare orchids have been found in a wildflower meadow created by a County Antrim school.

The Irish Lady's Tresses were found at Cambridge House Grammar School in Ballymena. There are only 2,000 of the flowers to be found in Europe. Northern Ireland is home to most of them.

The school set aside an area near its playing fields two years ago as part of a project to encourage pollinators.

The delicate white orchids were found this summer, much to the delight of project coordinator Rachel Conway.

She described it as a "rare and stunning plant". "It was the simplest thing to do, stop mowing, then mow once at the end of September, lift your cuttings and take them away and don't mow again until the following year.

"You can achieve amazing biodiversity at no extra cost and with less effort."

Senior teacher Myrtle Spence said the school used the wildflower meadow in its science lessons and it had been a great addition to pupils' learning. "It gives them that bit of hands-on experience of wildlife, habitats and ecosystems. "It has been a wonderfully enriching experience for the children."

EOCCE 2018 - EUROPEAN ORCHID SHOW & CONFERENCE - PARIS 2018

EOCCE 2018 - EUROPEAN ORCHID SHOW & CONFERENCE - PARIS 2018









THERE IS A WHOLE WORLD INSIDE EVERY PLANT

Plants have microbiomes, too, and they're full of untapped secrets

In Corvallis, Washington. Posy Busby works in a garden planted with 3,000 black cottonwood trees that represent 1,000 unique genetic specimens, each originally found somewhere on the West Coast of North America, from California to Canada. Cottonwoods are some of the fastest-growing trees in the world, and the garden looks a lot like a timber company plantation. But Busby, an ecologist at Oregon State University, studies something on a much smaller scale than trees—the microbes that live inside their leaves.

Busby started paying attention to microbes because she wanted to understand why wild plants plagued by a disease, such as leaf rust, fall ill in one place and not another. Genetics and environment could explain only part of this puzzle. But inside a plant is a whole world of microorganisms, and some of the cottonwoods' resident microbes seemed to have an impact on the severity of the leaf rust.

At first Busby thought of these bacteria and fungi as individuals that could be either troublesome or beneficial to the plants, like the fungus that causes leaf rust. But as she read up on the human microbiome, she realized that the microbial communities within plants were as complex as those within us. "We're really dealing with the same thing," she says.

Scientists have known for centuries that soil is packed with microscopic organisms and, since the late 1800s, that some plants form symbiotic relationships with fungi. But now they are finding that microorganisms live not just around but inside plants—in their roots, stems, and leaves—in greater numbers and with more diversity than anyone realized.

Busby's cottonwood trees, for instance, were known to have a handful of microbial pathogens. "But when we looked at the overall diversity of the fungi in the leaves, it was more like a thousand or 1,500 different fungi living in and on these leaves," across the tree's range, she says. "So that was an astounding number."

Just as we have learned that the human microbiome has a greater influence on human health than anyone imagined, there's an emerging understanding that the plant microbiome could be the key to floral health. One initial goal of exploring the plant microbiome has been to determine who's part of this community and what they're doing for the plant. The answer, it turns out, depends on location. If you're a plant, the place you live changes the ecosystem inside you, and that can affect your whole life.

"The plant's microbiome is strongly determined by where that plant is growing," Busby says. "It matters whether you're on one side of the mountains or the other. It even matters if you're 30 miles a way." As an example, about an hour north of Corvallis, there's another scientific garden of cottonwood trees, and, Busby says, "we see very different communities form in those two different places."

No one knew much about the microorganisms that colonize plants' external surfaces—and internal tissues—until the arrival of relatively cheap DNA sequencing. A single cottonwood leaf, for instance, might have 50 species of fungi and bacteria living inside. Roots and leaves in the same plant can have notably different microbial communities, but for any particular plant species, there are certain types of microorganisms that make up the community's core. But across a plant's range, this can vary greatly.

Some of the best-known mushrooms in the world are the fruits of mycorrhizal fungi, which grow in association with plant roots. When people raised in Europe or in the eastern half of America traveled west, they thought the mushrooms they found were the same as the ones they already knew. But now we understand that they're different species. "You find very regionally distinct communities of mycorrhizal fungi depending on where you are," says Kabir Peay, an assistant professor of biology at Stanford. These fungi, by the way, live both inside and outside a plant. They have filaments that reach out into the soil to fetch nutrients, but they also form what Peay calls "these really intimate structures, where they come in close proximity with plant cells," inside the plant.

Those regional variations in microbial or fungal communities, in turn, affect the structure of plant communities. Disease-causing microbes, for example, can keep one tree species from becoming dominant, but their impact depends on the mix of other microbes they live among. "What does it mean on a large scale when you change the composition of these communities and decrease their diversity?" says Peay. "I don't think we have the answer quite yet." But there are indications that it will matter—in a big way—as environments begin to shift. It seems like different microbes are "doing wildly different things" to forests, says Colin Averill, a postdoctoral researcher at Boston University, in Jennifer Bhatnagar's lab. "If you know which types of fungi are on the roots you can better predict the ability of the forest to sequester carbon and forecast [the effects of] climate change."

A fungus on white spruce roots.

How exactly a plant's microbiome makes changes like this is still a mystery, but last year a group of scientists, Busby included, proposed an agenda "analogous to the Human Microbiome Project," to promote research that could start answering these questions. Scientists are beginning to discover how incredibly diverse the metabolism of plant-associated microorganisms is, says Bhatnagar, an assistant professor at Boston University, with a potential impact on a variety of fields, such as drug discovery and environmental management. "That's one of the treasures of the plant microbiome that's still untapped—all the molecules these guys can make and how we can help make them," she says.

And keeping plants healthy is, in the end, a matter of human health, too. Understanding how to promote or manipulate a plant's microbiome so that it's healthier and more productive could lead to breakthroughs in agriculture and give farmers powerful tools other than fertilizers to boost production. If we can understand plant microbiomes, it might help us manage the rocky environmental future. "These cryptic organisms that live in plants contribute in meaningful ways to plant growth, plant development, and plant immunity," says Busby. "They could be the key to growing enough food for our human populations in the future." ■

Vanilla – little pods of comfort

The use of vanilla as a flavouring in food is started with the Aztecs – and was introduced into Europe after the Spanish conquered the Americas in the sixteenth century. Vanilla pods are a fruit that come from orchids that have been pollinated. Early attempts to introduce the flowers to Europe floundered, as the difficulties in pollinating the flowers couldn't be overcome. Eventually, this problem was solved and vanilla can be grown in other parts of the world – including Madagascar, the modern centre of the vanilla industry.

Separating vanilla from the fakes

Vanilla is one of the most expensive spices we use – more expensive than silver even. Part of the price is because of the labour-intensive nature of its production, that includes hand pollination and picking. One way to get around these higher prices is to use vanilla substitutes. But this is cheating consumers and sellers unless it is made clear that fake vanilla is being used.

One way that regulators and genuine vanilla sellers get around this is to use chromatography to separate real from fake. Liquid chromatography is a simple method that producers can use to establish whether the vanilla used is real or fake. Pushing the boundaries of chromatography's capabilities is an ongoing task as discussed in the article, "The Evolution of Ultra High-Performance Liquid Chromatography: Expanding the Future of Separation Technologies."

Deaths and theft for the farmers

But besides the costs of forgeries – recent reports suggest that the vanilla farmers of Madagascar are paying a much higher price. Farms are targeted by gangs of thieves who can strip the vines clear of pods in a single night. Farmers have taken to stamping individual vanilla pods with their own unique mark to identify stolen pods.

https://www.chromatographytoday.com

CYNORKIS CHRISTAE

Just when we thought all possible plant life has been discovered on this magnificent earth, Mother Nature surprises us again with huge and beautiful white orchids that – and this is where it gets really interesting – smells like champagne!

Austrian botanist Anton Sieder recently discovered a new species of orchid in the remote parts of Madagascar. The new discovery, *Cynorkis christae*, was named after Anton's wife Christa. The orchid has enormous flowers that reach 5 cm in length and stand on 16-inch tall stalks. They are mostly pure white with Burgundy spots in its center. However, what makes it really unique is its strong, sweet-smelling perfume reminiscent of champagne.

The *C. christae* flowers reach 5 cm in length by 16-inch-tall stalks; the petals are white with Burgundy spots in the center of the flower. Its main feature — a sweet smell, like the smell of champagne.

Madagascar is known for its vast wealth of unique, extraordinary orchids but never before had they found something as strange and wonderful as the *C. christae*. It is fairly new in science and would require more extensive research and study to know whether or not we'll be able to breed champagne-smelling orchids of our own very soon.

SAMANTHA NICOLE ALARILLA

(**Editor**: Royal Botanic Gardens researcher Johaan Hermans confirmed that the plant, now named *Cynorkis christae*, is new to science. "It is quite a find," said Johan, who saw the orchid in the flesh in January this year after travelling to the mountains with a team from Kew and Paris. "One of the most noticeable traits of this new orchid is its sweet scent, which one of our team likened to smelling like champagne," he added. (from **The English Garden**)

Cynorkis contains about 125 species of tuberous-rooted, mostly terrestrial plants. The genus was first described in 1822 by Aubert Du Petit-Thouars who coined the name from two Greek words, *kynosa* (dog) and *orchis* (testicle), to describe the small testiculate tubers of this genus. Cynorkis is a very attractive genus seldom seen in cultivation. The flowers are as pretty and showier than those of many cultivated orchids. Because Cynorkis species are deciduous and dormant for more than half the year, growers are discouraged from growing these species; the dormant plant is completely out of sight, making its container appear to be an empty pot of soil. These delightful plants are well worth growing and enjoying, however, as they go through a complete cycle – from emergence of the first leaf to the dispersal of seeds – in about five months.) ■

HOW PLANTS HAVE SEX

The sperm housed in a plant's pollen are unable to move themselves

They are carried to the egg of another plant through an invasive 'pollen tube'

Scientists have now captured this process in greater detail than ever before

Incredible footage reveals the closest look yet at how plants have sex - and scientists say it requires plenty of thrust.

The sperm housed in a plant's pollen are unable to move themselves, and so are carried to the egg of another plant through an invasive 'pollen tube'.

The tube powers through a maze of tissue to make it to the egg, and scientists have now captured this process in greater detail than ever before.

They showed that the water pressure used by a plant to drive its pollen tube into a mate is equivalent to the air pressure inside a car tyre.

Researchers at McGill University in Montreal, Canada, conducted the new study using tiny microchips attached to microscopic gates.

Scientists registered the force and movement of pollen tubes as they grew through the gates, allowing researchers to measure the process in fine detail.

'From a mechanical point of view, the process of pollen tube elongation is similar to that of a balloon catheter used in angioplasty – forces are generated based on fluid under pressure,' said study coauthor Dr Muthukumaran Packirisamy.

'So, we designed a microscopic cantilever with a gauge built in that the pollen tubes had to forcefully push against in order to continue to elongate.'

Pollen tubes have to push through a lot of matter to reach the egg, which is deeply embedded in the plant tissue.

These invasive tubes are the fastest growing cells in the plant kingdom, growing up to 0.8 inches (2cm) - or 500 times their original dimension - an hour.

They can sometimes extend up to 12 inches (30cm), depending on the anatomy of the flower.

But while scientists already knew much about pollen tubes, how they navigated had long puzzled scientists.

WHAT ARE POLLEN TUBES?

Unlike animal species, the sperm housed in a plants pollen cannot move.

Pollen tubes are used by plants to deliver sperm to an egg.

The appendages push through a lot of matter to reach the egg, which is deeply embedded in the plant tissue.

They can sometimes extend up to 12 inches (30cm), depending on the anatomy of the flower.

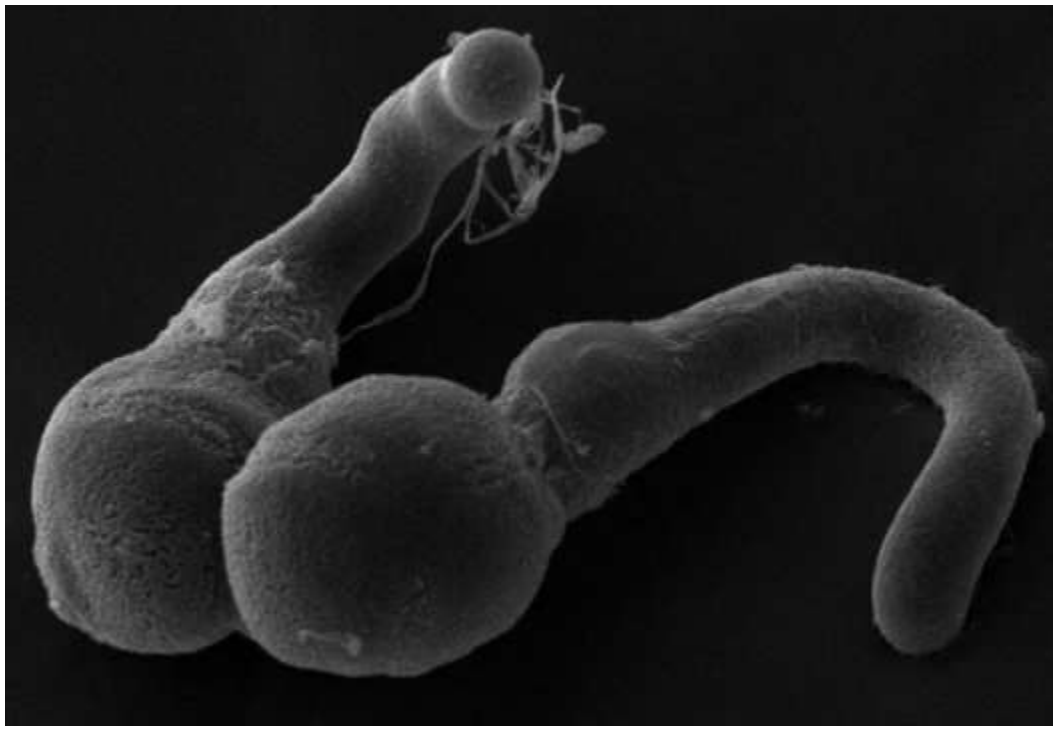
Using their new microchips, the Canadian team found that pollen tubes can divert their path when they encounter an obstacle.

The appendage changes its growth pattern, suggesting that the cells are in some ways able to 'feel' and respond to objects in their environment.

They also found that the water pressure exerted by the tubes is enormous, building the equivalent force to the air pressure within a car tyre.

Study coauthor Dr Anja Geitmann said: 'Thanks to the lab-on-a chip technology we were able to actually see and measure exactly what was going on within the pollen tube as it grew.

'It’s very exciting to be able to see this process, and it leaves us with a lot of interesting questions ahead about male-female communication.'



Electron micrograph of pollen grains forming pollen tbes in *Camilla japonica*

HOW A GIANT PARASITIC ORCHID MAKES A LIVING

The giant mycoheterotrophic orchid Erythrorchis altissima is associated mainly with a divergent set of wood-decaying fungi

Imagine a giant vine with no leaves and no chlorophyll scrambling over decaying wood and branches of a warm tropical forest. As remarkable as that may seem, that is exactly what *Erythrorchis altissima* is. With stems that can grow to upwards of 10 meters in length, this bizarre orchid from tropical Asia is the largest mycoheterotrophic plant known to science.

Mycoheterotrophs are plants that obtain all of their energy needs by parasitizing fungi. As you can probably imagine, this is an extremely indirect way for a plant to make a living. In most instances, this means the parasitic plants are stealing nutrients from the fungi that were obtained via a partnership with photosynthetic plants in the area. In other words, mycoheterotrophic plants are indirectly stealing from photosynthetic plants.

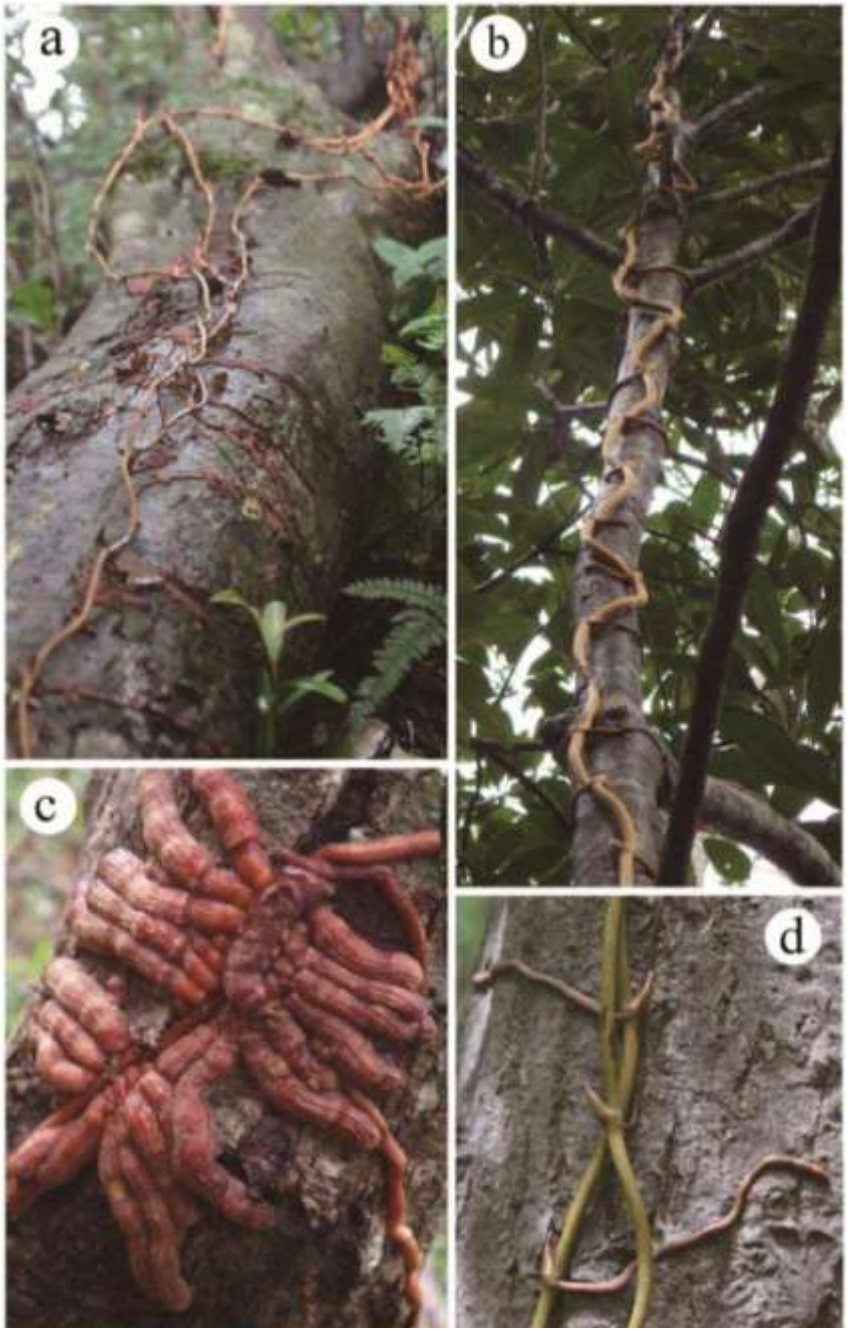
In the case of *E. altissima*, this begs the question of where does all of the carbon needed to build a surprising amount of plant come from? Is it parasitizing the mycorrhizal network associated with its photosynthetic neighbors or is it up to something else? These are exactly the sorts of questions a team from Saga University in Japan wanted to answer.

To ensure that these wood decay fungi weren't simply partnering with adult plants, the team decided to test whether or not the wood decay fungi were able to induce germination of E. altissima seeds. In vitro germination trials revealed that not only do these fungi induce seed germination in this orchid, they also fuel the early growth stages of the plant. Further tests also revealed that all of the carbon and nitrogen needs of *E. altissima* are met by these wood decay fungi.

These results are amazing. It shows that the largest mycoheterotrophic plant we know of lives entirely off of a generalized group of fungi responsible for the breakdown of wood. By parasitizing these fungi, the orchid has gained access to one of the largest pools of carbon (and other nutrients) without having to give anything back in return. It is no wonder then that this orchid is able to reach such epic proportions without having to do any photosynthesizing of its own. What an incredible world we live in!

All orchids require fungal partners for germination and survival. That is one of the main reasons why orchids can be so finicky about where they will grow. Without the fungi, especially in the early years of growth, you simply don't have orchids. The first step in figuring out how this massive parasitic orchid makes its living was to identify what types of fungi it partners with. To do this, the team took root samples and isolated the fungi living within.

Stems climbing on fallen dead wood (a) or on standing living trees (b). A thick and densely branched root clump (c) and thin and elongate roots (d) [Source]



By looking at their DNA, the team was able to identify 37 unique fungal taxa associated with this species. Most surprising was that a majority of those fungi were not considered mycorrhizal (though at least one mycorrhizal species was identified). Instead, the vast majority of the fungi associated with this orchid are involved in wood decay.

https://onlinelibrary.wiley.com/

Shenzhen Nongke Orchid: £160,000

This unique man-made orchid takes its name from Shenzhen Nongke University where it was created by Chinese agricultural scientists. The rare flower only blooms once every four to five years and was sold for the equivalent of £160,000 at auction.

THE DUBLIN ORCHID FAIR - 2018

National Botanic Gardens, Glasnevin, Saturday 21st & Sunday 22nd April 2018

The Dublin Orchid Fair, and the visit of the Royal Horticultural Society's Orchid Committee were great successes. Members and visitors had a large selection of orchids, both species and hybrids, to choose from at the sales table of Burnham Nurseries. Sales were brisk and by end of weekend there was little left to choose from. We hope you are enjoying your new purchases and that they grow and flourish.

The Royal Horticultural Society's Orchid Committee was given a tour of the Library and living collections by Brendan Sayers and then held their public meeting in the meeting room at the rear of Richard Turner's magnificently designed Curvilinear Range. Ten plants were put forward for judging and four were fortunate to be awarded. Two Miltoniopsis from the Eric Young Orchid Foundation received Awards of Merit, a Certificate of Cultural Commendation was awarded to Burnham Nurseries for their plant of *Maxillaria variabilis* and an unregistered hybrid cross (Zygodisanthus) of *Paradisanthus bahiensis* and *Zygopetalum* Kiwi Magic, with the cultivar name of Emerald Isle, shown by Michael Tibbs, received a Preliminary Certificate subject to being registered within the next 6 months.

Visitors to the Dublin Orchid Fair were greeted on entry to the Teak House by members of the Irish Orchid Society. Thanks to those who volunteered to sell raffle tickets, engage with visitors and help promote the Society. Another big thank you to members who brought along their plants for the IOS show. It was rewarding to see what members have growing in their collections and congratulations to those who were successful in the awards.

Orchid Judging. IOS Chair Brendan Sayers on right hand side with Miltonia Cheminde Milles Jardin de Soleil shown by the Eric Young Orchid Foundation

Sara Rittershausen of Burnham Nurseries demonstrating potting techniques

Royal Horticultural Society Orchid Committee meeting at the National Botanic Gardens Glasnevin 2018

Miltoniopsis Place Marche Fara Beacon
shown by the Eric Young Orchid Foundation

Born in 1911, Eric Young's fascination with orchids began in his teens. He lost his first collection during the Second World War, but a move to Jersey and a successful business career rekindled his passion. Not only did he amass one of the finest living collections, but he also supported the wider orchid world in a myriad of ways. Eric Young was truly one of the great orchidists of his time, and was widely respected and honoured throughout the international orchid community.

https://ericyoungorchid.org/

Deborah Lambkin with Zygodisanthus
Emerald Isle

Lisa Coffey
IOS Information Technology guru

Mary Bradshaw, IOS Treasurer

Gomesa echinata
(syn. Baptistonia echinata)

OrchidWire

Connecting a World of Orchids
.orchidwire.com/index.html

Swiss Orchid Foundation

The Swiss Orchid Foundation is working on a world orchid iconography (**orchid.unibas.ch)** and has slides, drawings and herbarium specimens from over 13,000 different orchid species, that you can find here: **orchid.unibas.ch/iconography.search.php**

BibliOrchidea

BibliOrchidea is with over 150,000 entries the largest orchid literature database worldwide.
orchid.unibas.ch/bibliorchidea/pages/applet.php

***GLOBAL TREE CANOPY COVER INCREASED BY 2.24 MILLION SQUARE KILOMETERS (865,000 SQUARE MILES) BETWEEN 1982 AND 2016, REPORTS A NEW STUDY IN* NATURE**.

Researchers using satellite data tracked the changes in various land covers to find that gains in forest area in the temperate, subtropical, and boreal climatic zones are offsetting declines in the tropics. In addition, forest area is expanding even as areas of bare ground and short vegetation are shrinking. Furthermore, forests in montane regions are expanding as climate warming enables trees to grow higher up on mountains.

Tree canopy in Europe, including European Russia, has increased by 35 percent—the greatest gain among all continents. The researchers attribute much of that increase to the "natural afforestation on abandoned agricultural land," which has been "a common process in Eastern Europe after the collapse of the Soviet Union."

If the **Nature** study is correct, the world gained 2.24 million square kilometers rather than lost 1.29 million square kilometers in forest area in the past three decades. Expanding woodlands suggests that humanity has begun the process of withdrawing from the natural world which in turn will provide greater scope for other species to rebound and thrive.

The study notes that the expansion of the agricultural frontier is the primary driver of deforestation in the tropics. "The three countries with the largest area of net tree cover loss during 1982–2016 are all located in South America: Brazil (-385,000 km2, -8%), Argentina (-113,000 km2, -25%) and Paraguay (-79,000 km2, -34%)," report the researchers.

These new findings contradict earlier studies that reported a continuing net loss of forest cover. ■

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