



## GUT REACTION | SUMMER 2022

Hi everyone,

I am delighted again to give an update on what has been happening at APC Microbiome Ireland over the Summer months. While COVID will remain with us and continues to disrupt some activities, it has otherwise been full steam ahead. A very welcome aspect has been our ability to have more in-person meetings with our stakeholders. Recently we have had very productive meetings with knowledge-based companies such as ADM, Fonterra and Reckitt. Some of these meetings have already been translated into research projects with APC opening up exciting opportunities in microbiome science and innovation. We were also really pleased with a visit from the newly appointed CEO of Adiso Therapeutics Inc. Scott Megaffin along with VP R&D Laurent Chesnel and Bharat Dixit CTO. Significantly, the company just had its first scientific publication and is just about to launch Phase II clinical trials with the live biotherapeutic ADS024.

As time moves on we have said farewell to some great friends and team members. A landmark event was the celebration of the career and retirement of Mary Hough who has been APC's finance manager from the outset. Mary was intrinsic to the grant application process which established APC in the first place and was a radiant presence around the APC. She will be greatly missed! And of course we welcome Seán Ahern to the hotseat who has stepped in as APC's new Finance Manager since July and is already part of the APC family.

This period has also seen some really impressive publications come out of APC. Some highlights are from the Gut Phageomics group headed by Colin Hill and Andrey Shkoporov with papers in *Nature Reviews Microbiology* and *Nature Microbiology* on various aspects of the virome/phageome. Other notable publications included an article from the Stanton lab on the early life microbiome in *Nature Communications*, a review on dietary recommendations in the context of the microbiome from Jens

Walter in *Cell Host Microbe*, and a review in *Science* by John Cryan who teamed up with Sarkis Mazmanian to put forward recommendations for brain-gut-microbiome research - particularly to probe causal relationships.

We continue to improve our facilities and platform capabilities it was great to see the new state-of-the-art Next-Generation DNA sequencer funded through an SFI Infrastructure grant being delivered to Teagasc Sequencing Facility at Moorepark under the leadership of Paul Cotter, which will vastly increase our sequencing capacity and output.





APC has had a busy Summer of events. An Taoiseach Michael Martin TD called to see our stand at Cork Carnival of Science, we hosted a Communications workshop with VistaMilk held at Devere Hall in UCC, and a Public Patient Involvement (PPI) event with Crohn's and Colitis Ireland (CCI) at the Kingsley hotel organised by Subrata Gosha.

Looking forward, Liam O'Mahony's EACCI Allergy Summer School kicks off UCC today. APC will also host many of the top microbiome researchers in the world at the IHMC (International Human Microbiome Consortium) workshop on the 6th of October to discuss approaches to defining a healthy microbiome. And lastly, we are really looking forward to our Annual APC Symposium on October 7th and seeing many of you there, embracing the theme 'Reconnecting' and announcing the 2022 Charles Donovan prize winner!!

All the best

Prof Paul Ross

Director APC Microbiome Ireland

## Farewell to Mary Hough



APC celebrated the retirement and career of Finance Manager Mary Hough after her invaluable contribution to APC which stretched back to the inception. Mary has been an invaluable member of the team and huge part of APCs journey. Mary's passion and dedication to her role and the overall success of APC will be remembered in equal footing to her love of fun and festivities.

## State of New Jersey Governor Phil Murphy





In April we were honoured to host State of New Jersey Governor Phil Murphy for a tour of APC labs in UCC as part of the Cork leg of his trade mission to Ireland. Governor Murphy took a great interest in the work carried out at APC and the impact our research has on the economy, health and wellbeing.

## Launch of video supporting research ‘Why the microbiome of Irish Travellers is important for everyone’



‘Why the microbiome of Irish Travellers is important for everyone’, a summary video of findings of research published by the prestigious journal [Nature Medicine](#), was launched at Cork City Hall by Cllr Dan Boyle at 2pm, Thursday 21 July as part of Traveller Pride Week 2022. This research by APC *Microbiome Ireland* (APC), a world-renowned Science Foundation Ireland Research Centre based in University College Cork and Teagasc found that Irish Travellers have a gut microbiome which differs strikingly from that of the non-Traveller settled community. Most of the Travellers retain an ancient or non-industrialised type of microbiome which may protect from many chronic inflammatory disorders; this sets the scene for unravelling how scientists can leverage the microbiome to minimise chronic inflammatory disorders for society at large. [Continue Reading](#)



## Ukraine Fellowship

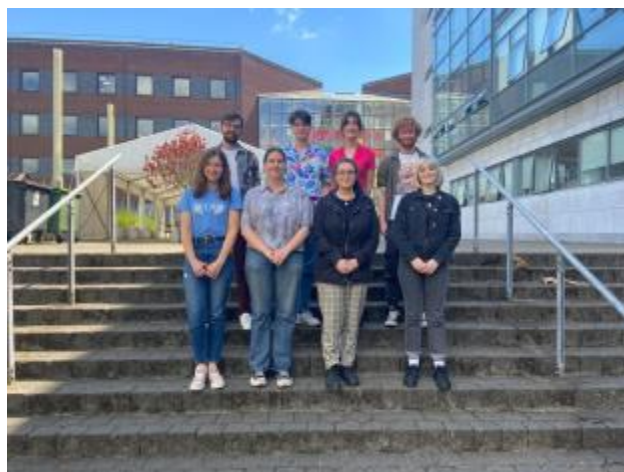


APC Microbiome Ireland created a two year senior postdoctoral fellowship in Cork for a scientist fleeing the war in Ukraine. Dr Kseniya Simbirtseva joined APC as a research fellow in Prof Paul O'Toole's lab where she will investigate the relevance of the microbiome in cognitive decline, specifically exploring the association between the gut microbiome and mild cognitive impairment, an early stage of cognitive decline. She and Prof O'Toole are collaborating with Prof Suzanne Timmons in St Finbarr's Hospital, Cork on this exciting project.

Special thanks to APC Operations manager, Dr Rafferty-McArdle who helped Dr Simbirtseva in relation to the logistics and documentation needed to move to Ireland. We also thank UCC who supported the APC Fellowship through the University Sanctuary Fellowship while UCC's Castlewhite Apartments kindly provided short-term emergency accommodation for Dr Simbirtseva and her family.

[Continue Reading](#)

## Summer Student Programme Returns



We were delighted to reinstate the APC Summer Students Programme after the COVID hiatus. It's great to see the strong work ethic and enthusiasm from our summer crew and to get to know some promising

scientists of the future. Joining APC for the summer were Ayomide Ajani, Sarah Altarkeet, Susan Burke, Aimee Cronin, Tadhg Valentine Keane, Megan Kerins, Tamara O'Connell, Cliona O'Connor, Catriona Organ, Bryan Power, Mark Vesey, Emma Wilson, Silvano Zuccarelli, Sean Blackburn, Jason Scully, Anton Torhov and Elena Gould.

## 2022 PostDoc Symposium



The APC Postdoc Committee organised the inaugural APC Postdoc Symposium in June. The day involved a packed agenda of inspiring talks followed by a fun packed evening BBQ where we got to socialise together as a team for the first time since the onset of COVID-19.

## Focus on Industry

### Adiso Therapeutics Visit



We were also delighted to welcome Scott Megaffin, Laurent Chesnel & Bharat Dixit of Adiso Therapeutics who recently visited APC and toured our labs at UCC and in Teagasc Moorepark. Adiso is creating medicines to treat inflammatory diseases and is advancing an innovative pipeline of small molecules and single strain live biotherapeutic products (SS-LBP) both with novel mechanisms of action

Pictured here with UCC Interim Director of Innovation Sally Cudmore, APC Director Paul Ross, APC PI Colin Hill and APC Interim General Manager Brendan Curran.

### Tate & Lyle Extends Collaboration With APC

# TATE & LYLE

In July, the APC was delighted to announce that it had extended its research partnership with Tate & Lyle, a leading global provider of food and beverage ingredients and solutions, through a new two-year research project to increase understanding of how dietary fibres can impact the functioning of the gut microbiome.



## Fonterra Visit



In June we were delighted to welcome team members from our partners at Fonterra at APC head offices in UCC. Mark Piper - Director Category, Strategy & Innovation and Mark Casey - Trade Strategy Manager EU pictured here with APC's Paul Ross and Brendan Curran. Fruitful discussions were held regarding how APC and Fonterra could build on our existing partnership based on areas of strategic overlap.

## APC and COVID-19



APC continues to publish exciting research relating to COVID-19. The findings from a large international study of hospitalised COVID-19 patients led by APC PIs Profs Liam O'Mahony and Paul O'Toole suggest that the outcome to SARS-CoV-2 infection depends in part on the types of interactions occurring between the patients' microbiota, metabolism and immune system.

**Albrich WC, Ghosh TS, Ahearn-Ford S, Mikaeloff F, Lunjani N, Forde B, Suh N, Kleger GR, Pietsch U, Frischknecht M, Garzoni C, Forlenza R, Horgan M, Sadlier C, Negro TR, Pugin J, Wozniak H, Cerny A, Neogi U, O'Toole PW, O'Mahony L (2022) A high-risk gut microbiota configuration associates with fatal hyperinflammatory immune and metabolic responses to SARS-CoV-2. Gut Microbes; 14(1):2073131. doi: 10.1080/19490976.2022.2073131.**

[Read press release and link to paper](#)

## Selection of recent APC Publications



Shkoporov AN, Turkington CJ, Hill C. (2022) Mutualistic interplay between bacteriophages and bacteria in the human gut. *Nature Reviews Microbiology*. Jun 30. doi: 10.1038/s41579-022-00755-4. Online ahead of print <https://www.nature.com/articles/s41579-022-00755-4.pdf?proof=t>

Shkoporov AN, Stockdale SR, A Lavelle, I Kondova, C Heuston, A Upadrasta, E V Khokhlova, I van der Kamp, B Ouwerling, LA Draper, JAM Langermans, RP Ross, C Hill (2022) Viral biogeography of the mammalian gut and parenchymal organs. *Nature Microbiology*. Aug;7(8):1301-1311 <https://www.nature.com/articles/s41564-022-01178-w>

APC scientists have recently published two significant *Nature* series papers on the role and distribution of the mammalian gut virome. The virome is the term used to describe the viruses that are always present in microbial communities, such as the gut microbiome. Most of these viruses prey on bacteria and are likely to play an important role in how the community functions. APC led by Profs Andrey Shkoporov, Paul Ross and Colin Hill has been studying these viruses (bacteriophage) and have made several breakthrough discoveries in recent years. The first paper above reviews the current state of

knowledge on the human gut virome, while the second paper is an original article mapping the distribution and diversity of the virome in the gut of two mammalian species.

**Zeng S, Patangia D, Almeida A, Zhou Z, Mu D, Paul Ross R, Stanton C, Wang S (2022) A compendium of 32,277 metagenome-assembled genomes and over 80 million genes from the early-life human gut microbiome. Nature Communications. Sep 1;13(1):5139. doi: 10.1038/s41467-022-32805-z. <https://nature.com/articles/s41467-022-32805-z>**

This is a hot-off-the-press article co-authored by APC researchers Dhrati Patangia, Paul Ross & Catherine Stanton. The paper presents the Early-Life Gut Genomes (ELGG) catalog with 32,277 genomes representing 2172 bacterial species isolated from children under 3 years old spanning delivery mode, gestational age, feeding pattern, and geography. The work provides new insights into the early-life human gut microbiome and will facilitate studies to understand the development and mechanisms of disturbances of the human gut microbiome in early life.

**FitzGerald J, Patel S, Eckenberger J, Guillemard E, Veiga P, Schäfer F, Walter J, Claesson MJ, Derrien M. (2022) Improved gut microbiome recovery following drug therapy is linked to abundance and replication of probiotic strains. Gut Microbes. Aug ;14(1):2094664. doi: 10.1080/19490976.2022.2094664. [https://tandfonline.com/doi/full/10.1080/19490976.2022.2094664#.YuIAri2\\_ziU.twitter](https://tandfonline.com/doi/full/10.1080/19490976.2022.2094664#.YuIAri2_ziU.twitter)**

This recent APC paper in collaboration with colleagues at Danone analysed the faecal microbiota of subjects who underwent a 14-day *Helicobacter pylori* eradication therapy with or without consumption of a multi-strain probiotic intervention (L. paracasei CNCMI-1518, L. paracasei CNCMI-3689, L. rhamnosus CNCMI-3690, and four yogurt strains) in a randomized, double-blinded, controlled clinical trial. The intervention led to a significant, although modest, improvement in the recovery of microbiota composition following antibiotic therapy, linked to the detection and replication of specific probiotic strains. Such functional insight can form the basis for the development of probiotic-based intervention aimed to protect gut microbiome from drug treatments.

**Caputi V, Bastiaanssen TFS, Peterson V, Sajjad J, Simons LP, Murphy A, Stanton C, McNamara B, Shorten GD, Cryan JF, O'Mahony SM. (2022) Sex, pain, and the microbiome: The relationship between baseline gut microbiota composition, gender and somatic pain in healthy individuals. Brain Behav Immun. Jun 7;104:191-204.**

[Continue Reading](#)

**Armet AM, Deehan EC, O'Sullivan AF, Mota JF, Field CJ, Prado CM, Lucey AJ, Walter J. (2022) Rethinking healthy eating in light of the gut microbiome. Cell Host Microbe. Jun 8;30(6):764-785. doi: 10.1016/j.chom.2022.04.016. [https://www.cell.com/cell-host-microbe/pdf/S1931-3128\(22\)00222-0.pdf](https://www.cell.com/cell-host-microbe/pdf/S1931-3128(22)00222-0.pdf)**

In this seminal review, APC's Jens Walter and colleagues discuss nutritional recommendations from a microbiome science perspective, focusing on mechanistic evidence that established host-microbe interactions as mediators of the physiological effects of diet. They apply this knowledge to inform discussions of nutrition controversies and to advance innovative dietary strategies. They also propose an experimental framework that integrates the microbiome into nutrition research.

**O'Donnell MM, Hegarty JW, Healy B, Schulz S, Walsh CJ, Hill C, Ross RP, Rea MC, Farquhar R, Chesnel L. (2022) Identification of ADS024, a newly characterized strain of *Bacillus velezensis* with direct *Clostridioides difficile* killing and toxin degradation bio-activities. Science Reports. June 3;12(1):9283. doi: 10.1038/s41598-022-13248-4. <https://www.nature.com/articles/s41598-022-13248-4>**

This paper arose from APC's ongoing research partnership with Adiso Therapeutics, a company that spun out of the APC (initially called Artugen Therapeutics) in recent years. The paper describes the identification and initial characterization of ADS024, a novel therapeutic bacterium that can kill *C. difficile* in vitro with limited impact on other commensal bacteria. ADS024 is in clinical development for the prevention of *C. Difficile* infection recurrence as a single-strain live biotherapeutic product, and this initial data set supports further studies aimed at evaluating ADS024 in future human clinical trials.

**Cryan JF, Mazmanian SK. (2022) Microbiota-brain axis: Context and causality. Science. May 27;376(6596):938-939. doi: 10.1126/science.abo4442. Epub 2022 May 26. <https://www.science.org/doi/abs/10.1126/science.abo4442>**

This was a key review paper in the leading journal *Science* by two of the most foremost pioneers in the brain-gut-microbiota research, Sarkis Mazmanian based at Caltech and APC's John Cryan. The authors summarise advances in the field based on experimental lab models and microbiome association studies and call for longitudinal studies that integrate genetic, environmental, and experiential factors in shaping and responding to gut microbial functions. They emphasise that only intervention studies with the ability to provide mechanistic insights will help to answer the question of whether or not the microbiome plays a causal role in improving altering behaviour or brain pathologies.

**Derrien M, Turrone F, Ventura M, van Sinderen D. (2022) Insights into endogenous *Bifidobacterium* species in the human gut microbiota during adulthood. Trends Microbiol. May 13:S0966-**

842X(22)00094-4. doi: 10.1016/j.tim.2022.04.004. Online ahead of print.  
[https://www.cell.com/trends/microbiology/fulltext/S0966-842X\(22\)00094-4](https://www.cell.com/trends/microbiology/fulltext/S0966-842X(22)00094-4)

In this opinion piece published in the leading microbiology review journal *Trends in Microbiology*, APC PI Douwe van Sinderen and international collaborators discuss the current knowledge regarding the relevance of endogenous *Bifidobacterium* species associated with adulthood. They identify knowledge gaps and discuss opportunities for microbiota enrichment with rationally selected strains of *Bifidobacterium* more adapted to the adult host.

## Profile: Caoimhe Byrne



**INTRO:** Caoimhe Byrne is the new Education and Public Engagement Manager at APC Microbiome Ireland. Caoimhe joined APC in May 2022.

**ROLE:** Caoimhe's role at APC is to support all staff – in academic, research and support roles - to connect the work and research done at APC and UCC with the wider community. Public engagement is multi-faceted; from outreach to collaborative research projects, there are a variety of ways in which you can engage with the public. Throughout the year, there are plenty of opportunities to get involved to strengthen your science communication skills and increase the visibility of your research. The EPE Comms team (Caoimhe & Tina) are here to help and can equip you with the tools and techniques to do engagement well.

**BACKGROUND:** Caoimhe qualified with a BSc Genetics from UCC in 2009 and began work as a research assistant on the SCOPE project in CUMH. She quickly realised a life in the lab just wasn't her thing and headed to Australia. In 2013, she completed a MSc in Science Communication and Public Engagement at the University of Edinburgh, returning to Brisbane to work at the Queensland University of Technology. After eight years in Australia (with a gap year in Scotland), she returned to Ireland in 2018 where she has held roles at the INFANT Research Centre, STEAM Education Ltd and finally, APC. Throughout her career, Caoimhe has designed, developed, and facilitated numerous outreach activities



and events like science festivals, school workshops, conferences, public seminars, STEAMart exhibitions and research dance groups.

**HOBBIES:** Caoimhe enjoys keeping fit, hiking, and reading and on the rare occasion a babysitter appears, a relaxed dinner and drinks with good company!

## Profile: Seán Ahern



**INTRO:** Seán Ahern is the new Finance Manager at APC Microbiome Ireland. Seán joined APC in July 2022.

**ROLE:** Seán's role involves all aspects of APC Finance from supporting budget proposals to post award management, audits and so on.

**BACKGROUND:** Having initially qualified with a BA in English and Archaeology from UCC, Seán moved to Asia where he lived for five years, primarily in Korea. He then returned to UCC and did a hDip in Accounting and Corporate Finance. Following this he trained in practice while doing the accounting exams. Prior to joining UCC he was Financial Controller for Carbery Plastics a leading Irish roto moulding company. Within UCC he has held a number of roles including within the Development Office, but has primarily been based in research accounting.

**HOBBIES:** Seán enjoys looking at his guitars and imagining what it would be like if he could play them well. He also likes kayaking, the beach and lying on his couch.



1 - World Microbiome Day 2022

The 2022 World Microbiome Day Festival had 37 events dotted throughout the globe, another successful year and testament to the interest and passion for microbiomes world over.

APC celebrations included a Fermented Food Workshop at Mitchelstown Library kicking off the first in a county wide series. The workshops are led by Dr John Leech and a team of APC researchers from UCC and Teagasc.



Once again we collaborated with Darina Allen, a prominent member of Ireland's food industry. Darina orchestrated a cooking demonstration of microbiome friendly foods in collaboration with APC's Dr John Leech. This was broadcast online and can be watched on demand.



APC's Monica Cazzinga took over UCC's instagram account for the day giving new audiences insights into a day in the life of a microbiome researcher.

## Equality, Diversity & Inclusion (EDI) Committee

Our EDI committee was set up as part of the APC Strategic Roadmap under the People and Culture Pillar. EMG approved Dr Susan Rafferty-McArdle as the inaugural Chair. Our first blended meeting was March 2022, the next is June 28th.

Quick wins have been

- Inclusion of a note on all APC adverts so that it is obvious to third country and non-EEA nationals that UCC can form Hosting agreements in relation to research positions
- Our APC team sheet has been changed so that not only binary gender identifiers are listed
- APC EMG did a trans awareness workshop with Gordon Grehan of Gendercare in May
- Philanthropy manager, Dr Jill Haynes, is reviewing methods of funding a scholarship for a student from a lower socio-economic background/ minority group

Susan has been attending the Management and working group meetings of [Gendervoices](#), an EU COST network, which aims to give voice to female early career investigators.

The [LGBTQIA](#) network in UCC sent us Ally paraphernalia, Susan has buttons and stickers for any who would like them.

One of our largest national groups will be featured as part of the entertainment at our Symposium in October. Look out for your APC colleagues in a wonderful [Indian](#) dance demonstration.

Contact Susan if you have suggestions or need information regarding EDI@APC.

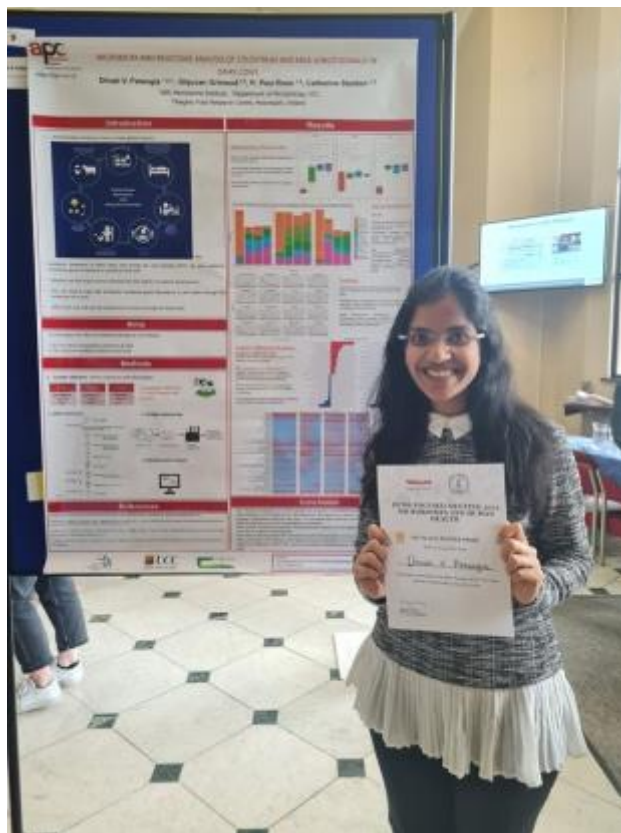


## APC Awards Successes



### UCC Research Awards

Congratulations to APC researcher Dr Maria Rodriguez Aburto who won Early Stage Researcher of the Year 2021 and former APC EU Grants Manager Saba Loftus who won Research Support Person of the Year 2021.



### Dublin Microbiology Society event Best Poster

Congratulations to Dhrati Patangia APC PhD Student working in the Stanton group on antimicrobial resistance at Teagasc who has won best poster at the Dublin Microbiology Society event at Trinity College Dublin this week.



### APC Post Doc Symposium

Congratulations to Ivan Daly who was awarded for best presentation, the vote was cast by attendees on the day .



### Nature Review Immunology prize at the WIRM Davos

Congratulations to Brian Forde for winning the Nature Review Immunology prize at the WIRM Davos, for his poster presentation entitled 'Immunomodulatory effects of microbial metabolites on G-protein coupled receptors in immune cells in allergy and asthma.'



## APC Funding Success



### **GENEGUT awarded 5.4 million**

An EU-funded research project, led by the School of Pharmacy in partnership with APC Microbiome Ireland SFI Research Centre at University College Cork (UCC) is seeking to revolutionise how Crohn's disease is treated has just been awarded €5.4 million in funding by the European Union (EU).

Crohn's disease (CD) is a chronic inflammation of the intestine where current treatment options are limited, it affects up to 3 million people across Europe and leads to health costs of over 5 billion euros per year.

Now **GENEGUT**, a four-year research project funded by Horizon Europe, is to develop the first oral RNA-based therapy for ileal Crohn's Disease. CD drastically impacts the quality of life of affected patients - and that of their families, friends, and caregivers. Most significantly, however, there is no satisfactory treatment. Despite advances, there is a pressing need for novel, advanced therapies. [Continue Reading](#)



### **APC awarded over €1 million in funding for emerging research talent.**

Congratulations to APC and University College Cork's Dr Linda Katona and Dr Maria Aburto whose projects today received over €1 million in funding under the new Irish Research and Science Foundation Ireland Pathway Programme created to support Ireland's emerging research talent as announced earlier today by Minister for Further and Higher Education, Research, Innovation and Science of Ireland Simon Harris

Read details <https://bit.ly/3PZ8Ni>



### APC Researchers Awarded Funding Under the SFI Frontiers For The Future Programme

Congratulations also to APC Researchers Prof Jennifer Mahony and Dr Olivia O'Leary who were awarded funding under the SFI Frontiers for the Future Programme.

## EPE

Elizabeth Brint  
Miguel Recio  
Cyrille Thinnes Susan Rafferty-McArdle  
Mairead Coakley  
**EPE Champions 2021**  
Victoria Spillane Sarah-Jane Leigh  
Erin Harris Jatin Nagpel  
Gaston Cluzel  
Henry Darch  
Rachel Fitzgerald  
Andriana Grafakou  
Ciaran Lee  
Liam Walsh

Education & Public Engagement Champions 2021

Congratulations to all those who were awarded EPE Champion status for 2021! The definition of an EPE Champion is broader than just participation - they act as role models, inspire others to participate and are actively involved in the development and delivery of EPE activities.



### **Cork Carnival of Science**

APC participated at the Cork Carnival of Science last month. Over 25,000 people attended this fun family event at Fitzgerald Park, including an Taoiseach Micheal Martin who dropped by for a tour of *'The Beast'*. A special thank you to all the volunteers who helped out over the weekend and delivered a highly engaging, hands on experience.



### **School Tour**

We were delighted to welcome students from Ballynoe NS to APC recently. The pupils were big fans of our Food is Funky workshop and had lots of great questions for APC Director, Prof Ross.



### **Communications Masterclass**

In collaboration with our colleagues at VistaMilk and 4TC Communications we hosted a 'What's the Story: Communications Masterclass' in Devere Hall, UCC. We were delighted to see so many in attendance on the day and hope that you will put into practice the tips, tricks and take-aways from all the sessions.



### **Kefir Day**

A number of local secondary schools were onsite at Moorepark for a science showcase to celebrate Kefir Day. Kefir4All is an exciting citizen science project being coordinated by APC, VistaMilk and Teagasc.



### World IBD Day

To celebrate IBD Day 2022, APC hosted two events - both online and in-person - for all of those affected by IBD, along with their family, friends and carers. Events like this allow our researchers the opportunity to engage and learn from those with lived experiences.



### Falling Walls Lab

Congratulations Miguel Fernandez de Ullivarri on winning 2nd place in the highly competitive Falling Walls Lab competition in Paris on May 24th. Miguel will now participate in the finals in Berlin in November.



## Contact Us



**APC Microbiome Ireland** is a world leading SFI research centre is a community of over 300 researchers, clinicians, managers and support staff based in University College Cork and Teagasc as well as partner institutions MTU, NUIG, UCD, NIBRT, UL and TCD.

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