



2020 Meeting Report

June 2-3rd 2020

Virtual Meeting

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Executive Summary

Due to the COVID-19 disease and its impact on travel and gatherings, ISAPP held its 19th annual meeting virtually. The 2020 meeting was planned to be held the first week of June in Banff, Canada. Instead, the board reworked the program to provide some live sessions June 2nd and 3rd and many recorded talks. Participating in the live events were 115 industry scientists, invited experts and students. For the two live discussion groups, 55 people participated in the group on environmental probiotics and prebiotics, and 87 attended the group on gut microbiota and viral infections. The meeting program included several different types of sessions, including:

- Several webcasted live presentations, including keynote speaker Bonnie Schmidt.
- An interactive “Springboard” session brainstorming ideas about messaging probiotics and prebiotics to scientists, media, the general public, and physicians.
- Recorded planned talks featuring synbiotics, fermented foods, postbiotics, the taxonomy of the *Lactobacillus* genus complex, probiotics and prebiotics for preterm infants, GI conditions, gut microbiota, and as dietary supplements.
- Three industry research talks, and nine student lightning talks.
- Two late breaking news talks.
- Two virtual discussion groups.

Recorded talks and abstracts for the meeting are available to meeting participants on the ISAPP website under “[2020 Annual Meeting](#)”. ISAPP gratefully acknowledges the support of the 50 [member companies](#), who supported the mission of ISAPP in 2020.

The meeting program was developed and executed by the 2020 ISAPP Board of Directors.

The ISAPP Board of Directors

The board members who diligently guided ISAPP's activities for the year preceding the 2020 virtual meeting.

Back row: Eamonn Quigley, Colin Hill, Gregor Reid, Hania Szajewska, Bob Hutkins, Glenn Gibson, Karen Scott

Seated: Mary Ellen Sanders, Dan Merenstein, Seppo Salminen, Sarah Lebeer, Maria Marco



Discussion Groups (Summaries Submitted by Group Chairs)

Group 1: How your gut microbiota can help protect against viral infections

Chairs: Sarah Lebeer – University of Antwerp, Belgium and Karen Scott – Rowett Institute, University of Aberdeen

Around 85 members of the ISAPP community joined the ‘Zoom’ discussion forum to listen to the introductory presentations and participate in the ensuing debate/discussion. ISAPP BOD members Karen Scott and Sarah Lebeer were joined by the invited experts Joel Dore (INRAE France), Tine Licht (Technical University of Denmark), Mary O’Connell-Motherway (APC Microbiome, Cork) to introduce the topic and lead the discussions. The discussion started with the gut microbiota, but expanded to include those colonising other body sites, and the impact microbial metabolites produced in the gut, such as butyrate, can have on other body sites.

The human microbiota is diverse, performs many different functions, and crucially the different members of the microbiota interact with each other. These interactions between different members of microbial community were the focus of our discussion – both the positive and negative interactions. Bacterial activities can be widespread, frequent or rare – and it is often the rare activities that have important impacts on the course of a disease. Specific examples discussed were antimicrobial agents produced by some bacteria that prevented *Salmonella* infections in pigs and cured mastitis in cows.

The microbiota has a dual and complex role interacting with viruses. Some members of the microbiota can prevent attachment of the viruses to cell surfaces by offering alternative receptors while in contrast virus particles can utilise other bacterial cells to “mask them” and facilitate entry to host cells. Other members of the microbiota can stimulate the immune system to promote elimination of a viral infection, while, on the flip side this same

immune activation may promote viral infection. Thus it is important that any use of specific bacteria (ie probiotics) to help prevent or clear viral infections is first carefully tested to investigate possible unintended consequences. It is possible that probiotics or prebiotics may be considered as an adjunct therapy alongside vaccination. However, any such addition to a vaccine is likely to be secondary as the essential specific testing of the combination would take longer and introduction of an effective vaccine should not be delayed, even if it could then be subsequently improved.

Metagenomics has been widely used to investigate the microbiota in the context of health and disease, with the aim of identifying possible causative and preventative organisms or signatures. Frequently, a disruption in the microbiota composition results in a less diverse, lower 'richness' microbiota, which is often linked to a leaky gut syndrome, higher gut inflammation and more oxidative stress. This increased oxidative stress then exacerbates the microbial dysbiosis, causing more inflammation and increased leaky gut – creating a vicious cycle effect. These four factors are linked to various diseases associated with the central nervous system, the gastrointestinal system and also to metabolic and immunological diseases. These very same diseases represent some of the 'underlying health conditions' that are linked to higher severity and worse outcomes for Covid-19 infections. Thus there is potential for trying to redress the balance in the microbiota to prevent not only those diseases directly linked to the dysbiosis, but also to make people more resilient to other infections such as Covid-19. The diversity of the existing resident microbiota may be increased by the application of probiotics, prebiotics or synbiotics, included within a healthy, diverse, high-fibre diet. These approaches may improve bacterial fermentation in the large intestine, resulting in increased production of important bacterial metabolites, including short chain fatty acids, involved in host signalling and other functions. Such an approach could be particularly important in building up resilience in the elderly population.

The respiratory tract is colonised by its own distinct microbiota, and it also is important to maintain health, playing a crucial defensive role. Probiotics may also have a role here in the battle against Covid-19 (either preventing infection or enhancing recovery), but again these would have to be tested on a case-by-case basis. The best routes for application would also need to be considered. The direct route through nasal application is one option but, given the existence of the gut-lung axis, and transport of gut produced bacterial metabolites around the body, oral administration may also be effective. Probiotics that have already been shown to be effective against other viral upper respiratory tract infections may have promise, and there are already studies underway investigating these.

There was also some discussion around the potential side-effects the worldwide lockdown to contain SARS-CoV-2 may have on other aspects of health. There has been considerable emphasis in different countries on the negative impact on mental health of isolation and the additional stress brought on by direct concern about the virus and the related situation, but also worries about job security. We also spent some time discussing the potential impacts of the improved hygiene measures on the developing microbiota in infants and young children and whether this would result in a rise in allergic and other immune diseases in this “generation C”. This will no doubt be the basis of some new research in the future.

Despite the unprecedented worldwide scientific efforts and collaborative working, it is unlikely that an effective vaccine against SARS-CoV-2 will be widely available soon. Meantime we have to protect ourselves and the ‘at-risk’ population as best we can. Scientific evidence suggests that keeping our gut microbiota as complex and healthy as possible by eating a diverse, high fibre diet (supplemented by fermented foods, probiotics and prebiotics) can help mitigate the spiral into a low richness microbiota and gut inflammation. Similarly, we must also preserve the microbiota on other body sites. This may subsequently reduce development of those diseases represented within the “underlying health conditions” resulting in more severe SARS-CoV-2 infections. In essence,



we need to keep our own microbial army in prime condition and armed to fight off unwelcome invaders.

Group 2: Environmental probiotics

Chair: Gregor Reid – Lawson Health Research Institute and Greg Gloor – Western University

The goals of this discussion group were twofold:

1. Identifying the scope and importance of using beneficial microbes for environmental/ecosystem purposes
2. Categorize which products/applications should not be included in the probiotic/prebiotic definition and which should not.

The schedule for the session follows:

		Speaker
10.00am	Introductions – The panel of experts	Gregor Reid, Lawson Health Research Institute, Canada
10.10am	Examples of what's out there – from yoga mat sprays to coated toilet paper	Gregor Reid
10.20am	Biodegradation and bioremediation in waste-water treatment systems	Greg Gloor, Western University, Canada
10.30am	Biodegradation of drugs	Jeanne Kagle, Mansfield University, PA, USA
10.40am	Waste-water and aquaculture	Rao Changanti, University of Michigan, USA
10.50am	Plant and crop production	Akos Kovacs, Denmark
11.00am	Plant health to improve milk productivity in cows	John Al-Alawneh, University of Queensland, Australia
11.10am	Honey bees as recipients and deliverers of probiotics (Elina Nino was supposed to present, but Brendan filled in at last minute)	Brendan Daisley, Western University, Canada
11.20am	Open discussion on categorizing which products/applications are probiotic/prebiotic and which are not	Gregor Reid - mediator
Noon	Adjourn	

Key Points from the Presentations and Discussion

1. This virtual session was attended by 55 people including several ISAPP Board members, students and fellows, industry scientists and experts.
2. The outstanding presentations illustrated the breadth of applications across the environment for probiotics, prebiotics and beneficial microbes. These included degradation of highly toxic compounds and drugs in waste-water treatment facilities; applications to salmon, trout and shellfish farming and beekeeping; probiotics for plant hosts (improving growth, yield, health) and their subsequent benefits to livestock (improving health, milk production, less mastitis) and humans.
3. Website examples of some uncommon products (e.g.odor reducers, sanitizers, mattresses, etc) labeled as 'probiotic' or 'prebiotic' were selected at random (see table below) to illustrate the current marketplace (mis)use of these terms. It was proposed that these products do not meet the published definitions and should use other terminology, for example as below. In many of the examples provided, even if evidence was available to prove some type of benefit from such products, it is clear that not all conceivable microbe-induced benefits should be considered to be probiotic benefits. Companies need to refrain from using the terms probiotic and prebiotic when they do not meet the relevant criteria.
4. The session raised critical points about the breadth of the probiotic and prebiotic definitions.

Probiotic: "Live microorganisms that, when administered in adequate amounts, confer a health benefit on the host".

Prebiotic: "A substrate that is selectively utilized by host microorganisms conferring a health benefit"

- The 'host' has to be a living organism. It cannot be dirt or nutrients in soil, nor a commensal such as Rhizobium that provides a benefit to plant growth. But, potentially a host could be a microbe, such as one administered to the soil that is then shown to confer a benefit to the plant.

- There seems to be consensus that further discussion on what constitutes a 'host' is warranted, given the range of products now claiming to be probiotic or prebiotic. This could clarify issues such as phage, other microbes, unicellular v multicellular, direct v indirect effects.
- The word host in the context of the Hill et al 2014 paper was understood to mean a live organism. It was not limited to humans, but includes also companion and agricultural animals, fish, plants, insects, etc.
- If we consider a host being another microbe, how does that fit the definition? It can't simply be mutualism. What is meant by a 'health' benefit? The World Health Organization definition of health is "a **state of complete physical, mental, and social well-being**, and not **merely the absence of disease or infirmity**". This implies that hosts need to have a 'brain' to be mentally well. If we ignore the 'mind' part and just state free from disease, would that work?
- The issue of whether the effect needs to be direct or can be indirect was raised and not fully resolved during the meeting. Does the probiotic effect need to be direct or can indirect effects qualify? Although there are many beneficial effects of microbes (making fermented foods, producing antibiotics, processing waste water, etc), our current understanding is that a probiotic must exert a benefit on the host directly. However, clarification of this point may be needed. The issue was raised that removing a toxin or drug from waste-water is a primary intent and a benefit to humans who subsequently drink the water, but the primary benefit is to degrading a toxin not to contributing to human health, thus the application to the waste-water treatment would not represent a probiotic.
- In a waste-water treatment system, could a probiotic be applied to propagate the 'beneficial strains'? Not unless there was correlation with a specific benefit to the host which downstream might be fish, frogs, or animals and human consuming the water. But this needs more thought. It is important to

remember intent, reasonable interpretation and avoidance of incorrect extrapolation of the definitions.

- In the case of using a probiotic to cover plants or soil and the strain ends up helping the plant grow via the roots, is improving yield a health benefit? If the ‘healthier plant’ then has better nutrition for the cow which then produces more milk and the cow has less mastitis, is this a secondary probiotic benefit? Is this a benefit due to a post-biotic? Of note, a consensus statement and definition of ‘postbiotic’ is pending publication.
- If the ‘probiotic’ is improving yield, would it not simply be called a fertilizer?

Product	Does it meet the definition?	What should it be designated?
SCD Probiotic home and garden and other household cleaners: microbial consortia	No	Microbial cleaner?
Betterair probiotic purifier: unknown content?	No	Spore-forming bacterial cleaner?
PureBiotics: spore-forming bacteria	No	Spore-forming bacterial cleaner?
Z-Probiotic: mixture of organisms for cleaning	No	Microbial cleaner?
ProBac cleaner	No	Spore-forming bacterial cleaner?
Luma probiotic cotton mattress	No	?
Aveeno Moisturizer	No	Moisturizer with colloidal oatmeal
Andrex prebiotic toilet paper: almond oil, butter, argan oil	No	Lotion-coated toilet paper
Beneo inulin cleaner for farmers	Yes Prebiotic	
Chrisal's mist	No	?
Yogibiotix yoga mat cleaner	No	No longer on market?
Natren's Jourdan Probiotic aftershave	No	Fake news?

In summary, thanks to all who presented and took part in the discussion. I trust this properly represents the session and provides an insight into points raised by participants. There are clearly issues that need to be further resolved and potentially presented as a paper or some other printed document, at least urging companies to use alternatives to probiotic and prebiotic until they sufficiently prove their product fits the definition. That remains for the future.



Late Breaking News

Our typical Late Breaking News session offers 12-5 min talks in an informal, interactive atmosphere. All meeting participants are invited to give talks. This year, we had two talks for this session:

1. Criteria to qualify microorganisms as ‘probiotic’ in foods and dietary supplements. Arthur Ouwehand, Finland.
2. ISAPP videos and infographics – translations. Roberta Grimaldi, UK.

Students & Fellows Association

For the 2020 meeting, 25 SFA members were planning to come to Banff and share their research on probiotics, prebiotics, or related fields. When the face-to-face meeting was cancelled, nine presenters agreed to provide short recorded talks about their research (see Appendix A). All SFA members who submitted abstracts to the live meeting were invited to participate in the virtual meeting.



Appendix A: 2020 ISAPP Meeting Program

PROGRAM

The ISAPP annual meeting program consisted of (1) live sessions and (2) recorded sessions.

(1) RECORDINGS OF LIVE SESSIONS

Tuesday, June 2, 2020

- 10:00-11:25 am [ISAPP welcome](#), Seppo Salminen, University of Turku, Finland
- Introduction & [Keynote lecture: *Own the message*](#), Bonnie Schmidt, Let's Talk Science, London, Canada. [Summary](#).
- [Summary of learning for ISAPP](#), Chris Cifelli, ISAPP Science Translation Committee chair
- 11:25-11:40 am Break
- 11:40 am -12:00 pm Virtual Springboard session opening comments: *Effectively communicating probiotic and prebiotic science: what are the ways forward?* Glenn Gibson, University of Reading, UK.
- 12:00-12:55 pm Virtual springboard concurrent discussions
- Session A: *Messaging for the general public*, Glenn Gibson, Mary Ellen Sanders, Luana Langlois
- Session B: *Messaging for scientists and nutrition professionals*, Gregor Reid, Brendan Daisley
- Session C: *Messaging for physicians*, Dan Merenstein, Colin Hill, Karen Scott
- Session D: *Messaging for traditional media and social media*, Chris Cifelli, Kristina Campbell, Maria Marco
- 12:55-1:15 pm Virtual springboard summary, Glenn Gibson, Dan Merenstein, Gregor Reid, Chris Cifelli

Wednesday, June 3, 2020

- 8:00-9:30 am Virtual discussion group: *How your gut microbiota can help protect against viral infections*, Karen Scott & Sarah Lebeer



10:00 am – 12:00 pm Virtual discussion group: *Environmental probiotics*, Gregor Reid & Greg Gloor. [Summary here.](#)

(2) RECORDED SESSIONS

Click on session titles below to view videos.

Introduction

ISAPP president's update, Seppo Salminen, University of Turku, Finland.

Consensus Panel Updates

Synbiotics consensus panel, Kelly Swanson, University of Illinois, Champagne-Urbana, USA.

Fermented foods consensus panel, Maria Marco, University of California – Davis, USA.

Postbiotics consensus panel, Gabriel Vinderola, UNL-CONICET, Santa Fe, Argentina.

Short talks

Update of the taxonomy of the Lactobacillus genus complex, Sarah Lebeer University of Antwerp, Belgium.

ESPGHAN recommendations on probiotics for preterm infants and for acute gastroenteritis, Hania Szajewska, Medical University of Warsaw, Poland.

Asian recommendations on probiotics, Reuben Wong, National University of Singapore, Singapore.

AGA recommendations on probiotics for GI conditions, Geoffrey Preidis, Baylor College of Medicine, Houston, TX, USA. Handout.

Plenary lectures

Microbial ecology: a framework for understanding probiotics/prebiotics, Isabelle Laforest-Lapointe, Université de Sherbrooke, Québec, Canada.

Prebiotics and degenerative neurological disease, Ali Keshavarzian, Rush University Medical Center, Chicago, USA.

Precision microbiome modulation through discrete chemical carbohydrate structures, Jens Walter, University College Cork, Ireland.

What's new in gut phage? Colin Hill, APC Microbiome, University College Cork, Ireland.

Late breaking news

Criteria to qualify microorganisms as 'probiotic' in foods and dietary supplements, Arthur Ouwehand, DuPont Nutrition and Biosciences, Finland.

ISAPP videos and infographics – translations, Roberta Grimaldi, GSK Consumer Healthcare.

IAC Research Talks

Production of postbiotic metabolites by infant-type Human-Residential Bifidobacteria (HRB) and their health potentials in infant gut, Jin-zhong Xiao, Morinaga Milk Industry Co. Abstract.

Integrating video camera endoscopy technology in probiotics research, Andrea Doolan, Atlantia Food Clinical Trials. Abstract.

Vitamins for the gut microbiome, Wilbert Sybesma, DSM Nutritional Products, Switzerland. Abstract.

Students and Fellows Association (SFA) Lightning Talks

Lactobacillus rhamnosus GR-1 protects from airway hyperreactivity and gut microbiome shift in a mouse asthma model, Irina Spacova, University of Antwerp, Belgium. Abstract.

Anti-allergic and immunomodulatory effect of oral administration of high conjugated linoleic acid (CLA) producing Butyrivibrio fibrisolvens F-7 in mice sensitized with ova-albumin, Anima Srivastava, Amity University, India. Abstract.

Assessment of Commercial Kefir Products for Label Accuracy of Microbial Composition and Quantity, Breanna Metras, University of Illinois at Urbana-Champaign, USA. Abstract.

Topically applied lactobacilli have anti-inflammatory and immunomodulatory effects in inflammatory skin conditions, Lize Delanghe, University of Antwerp, Belgium. Abstract.

Fishing for the right probiotic: Improving gut barrier function in salmonids to reduce pathogen susceptibility and increase aquaculture production yield, Luana S. Langlois, Western University, Canada. Abstract.

Anti-proliferation Effects of Lactobacillus spp. of human origin on colon cancer cells, Roya Ghanavati, Behbahan Faculty of Medical Sciences, Iran. Abstract.

Exploring the potential of probiotics to eliminate urogenital malodour: a metabolomics approach, Scarlett Puebla-Barragán, Western University, Canada. Abstract.

In-vitro anti-inflammatory effect of a probiotic candidate bacteria secreted protein fraction, Shrijana Shakya, Hiroshima University, Japan. Abstract.

"ProBioPred" an online server for the prediction of a potential probiotic candidate using machine-learning approach, Vikas Ghattargi, National Centre for Cell Science, India. Abstract.

Appendix B: Acknowledgements

Thank You for Supporting ISAPP in 2020

