

2023 Annual Report

January 1 - December 31, 2023



2023 ISAPP Annual Meeting, Denver, USA

Introduction

The International Scientific Association for Probiotics and Prebiotics (ISAPP) is the international non-profit organization that works to advance the science of probiotics, prebiotics and related substances, such as synbiotics, postbiotics and fermented foods.

ISAPP's activities focus on fostering scientific discussion and collaboration, identifying and driving forward robust outputs on the most important scientific issues, and educational and stewardship efforts to cultivate accurate knowledge of biotic substances amongst health care professionals, consumers, scientists, regulators and other stakeholders. ISAPP thrives on the contributions of a multidisciplinary community of scientists, clinicians and other professionals from diverse settings, including academic, industry, healthcare and government backgrounds.

In 2023, ISAPP's 21st year, the organization continued to pursue its mission of advancing scientific excellence in the biotics field through a wide variety of avenues. This report provides an overview of key accomplishments and activities during the year.



Networking at the Annual Meeting, Brown Palace Hotel

Organizational update

ISAPP Board of Directors

ISAPP is governed by a volunteer <u>board of directors</u> composed of expert academic scientists with diverse backgrounds and expertise across the field of biotic science. Prof. Dan Merenstein MD continued to serve as ISAPP President throughout 2023, with Prof. Maria Marco PhD serving as Vice President. Prof. Seppo Salminen PhD, Dr. Gabriel Vinderola PhD, and Prof. Daniel Tancredi PhD served as Past President, Secretary and Treasurer, respectively. See Appendix A for the full board of directors for 2023.

During 2023, ISAPP welcomed the addition of Prof. Kristin Verbeke PhD from Katholieke Universiteit Leuven in Belgium as a board member-at-large, bringing expertise across microbial metabolism and analytical methods for assessment of metabolomic and gastrointestinal parameters, applied across preclinical and clinical studies using dietary, probiotic and prebiotic interventions.

ISAPP's Executive Director serves to facilitate ISAPP activities. This year marked the retirement of Dr. Mary Ellen Sanders PhD, long time Executive Director and Executive Science Officer and a founding board member of ISAPP. Much gratitude is extended to Mary Ellen for her long years of service to the ISAPP community and the field at large. In April 2023, Marla Cunningham took up the role of Executive Director, following previous industry roles in research, innovation and healthcare provider education.

ISAPP Industry Advisory Committee

The ISAPP Industry Advisory Committee (IAC), comprising representatives from industry member companies, plays a valuable role in advising ISAPP on key issues of interest, participating in collaborative scientific projects and papers, and bringing a translational lens to the ISAPP community. The IAC exists in an advisory capacity only and does not hold voting power or authority over the decisions of the board of directors of ISAPP. As a scientific society, ISAPP ensures its activities are directed by the goal of scientific advancement, rather than category advocacy or promotion.



ISAPP is grateful for the support and engagement of 63 member organizations in 2023, helping the organization to realize its mission of advancing scientific excellence in probiotics, prebiotics, synbiotics, postbiotics and fermented foods. See Appendix B for a complete list of member organizations in 2023. See here for more details on the requirements and benefits of industry membership.

Each year, two members of the ISAPP Industry Advisory Committee are elected to serve as IAC representatives, attending board meetings and representing industry perspectives. In April 2023, Dr Mariya Petrova PhD (Winclove,

Amsterdam) assumed the role of Senior Industry Advisory Committee representative and at the June meeting in Denver, Dr Shalome Bassett PhD (Fonterra, New Zealand) was elected to the Junior representative position.

ISAPP is a place you can go and ask a question and get a credible science-based answer to the question. The scientists aren't afraid to put forward their thoughts and opinions, and the IAC hear them before they become mainstream.

ISAPP Industry member scientist

ISAPP Students and Fellows Association

The <u>ISAPP Students and Fellows Association</u> (SFA) is a student-led branch of ISAPP, consisting of early career scientists (graduate students and postdoctoral fellows) across the globe working in probiotics, prebiotics and related fields. The SFA community provides a link between early career researchers and established academic and industry scientists within the ISAPP community, fostering stimulating exchanges, new connections and collaborations. A

portion of all ISAPP industry member dues fund the SFA. Alongside other activities, the SFA runs a competitive abstract selection program. Successful SFA members are granted partially funded places to participate in the ISAPP annual meeting for poster and plenary presentations as well as professional development opportunities.

Volunteers from the SFA membership comprise the Executive Committee, which is appointed each year to govern the SFA organization. In the second half of 2023, Dr. Cathy Lordan PhD assumed the position of SFA President, replacing Dr. Brendan Daisley PhD, who resumed service as Vice President. Breanna Metras assumed the role of Treasurer, David Hourigan as Secretary, Dr. Sarah Ahannach PhD as Director of Outreach and Community Engagement, and Patricia Sanz Morales as Director of Communications and Development. Prof. Sarah Lebeer PhD remained liaison to the SFA from the ISAPP board of directors.

(The ISAPP annual meetings) are a really powerful way of developing a community in the field of probiotics and it is always a pleasure to attend them. Students gain so much in terms of industry connections and exposure to cutting edge science/techniques in the field.

ISAPP SFA member, ISAPP 2023 meeting, Denver

Annual scientific meeting

ISAPP held its 2023 annual meeting in Denver, Colorado, USA on June 26-28, bringing together scientists working in the field of biotics to share the latest developments, discuss topical issues and create new connections and collaborations. 151 attendees gathered from 22 countries, comprised of 61 industry scientists from member companies, 62 invited experts and board members, and 28 SFA-supported students and postdoctoral researchers. The primary meeting activities were as follows:

- Networking on innovation: For industry and student member scientists, a new session format was debuted within the pre-meeting program. A set of interactive, small group innovation workshops connected industry and early career scientists to exchange knowledge and fertilize new perspectives on four key topics for innovation – food and biotics, prebiotic developments, probiotics beyond the gut, and microbiome models and screening methodologies.
- Microbiome study design: The industry-organized plenary session addressed the current known and future directions for scientists designing and interpreting clinical studies with microbiome endpoints.
- Plenary lectures: Talks from global experts covered a diverse array of topics, including interventions for microbiome maturation in early life as well as resilience in adulthood; vaginal microecology and immune interactions; predictors of interindividual prebiotic response; mechanistic and clinical advances in the gut brain axis field; and exploration of microbe:microbe interactions upon probiotic administration, amongst other topics.



- Progressing topical issues: Half-day discussion groups were convened around six key questions of current and future relevance in the biotic field. Invited subject matter experts presented relevant data, perspectives, considerations and questions, with discussion amongst the group of attending scientists. Summaries of the group findings were presented back to the larger meeting audience the following day, and peer-reviewed publications will follow for some topics. The topics addressed included use of biotics for animal health, evidence for biotics in healthy populations, whether probiotics act via microbiota alteration, targeted prebiotic design, development of microbiome therapeutics and prevention of Clostridioides difficile infections.
- Showcasing diverse projects: The scientific poster session featured 36 industry and student posters sharing emerging research projects from across the world. In the leadup to the meeting, 85 submissions for ISAPP SFA competitive abstract selection were received from students and fellows across 23 countries, showcasing an impressive breadth of biotic science being carried out globally. 28 SFA members received travel and lodging support to attend the June meeting in Denver and actively participate in the program.
- Engagement with broader audiences: One of the ISAPP conference days overlapped with World Microbiome Day, a global event raising awareness of microbiome science. ISAPP engaged with the World Microbiome Day community via social media and produced a short video on the connection between the microbiome and biotics.

For further information on the 2023 annual meeting, the full meeting report can be viewed <u>here</u>. Presentations from the meeting can be accessed by members on the password-protected site <u>here</u>.



2023 ISAPP Gala, History Colorado Center

I gained an enormous amount of new insights and met some very interesting colleagues who are interested in carrying on collaborations. I would recommend this innovative event to anyone in the area.

Invited expert, ISAPP 2023 meeting, Denver

Expert panels

• Restoration of antibiotic-perturbed microbiota with probiotic administration. In March 2023, ISAPP convened an expert panel in London to discuss what is known about the ability of probiotics to restore an antibiotic-perturbed microbiota. The topic was suggested by a member of the Industry Advisory Committee. The panel included 11 academic experts bringing knowledge across multiple backgrounds, including probiotics, clinical trials, microbiome analysis and statistical methods. The resulting manuscript is currently undergoing peer review.

Collaborative papers

- Frequently asked questions about the definition of postbiotics. In order to further understanding and
 discussion on postbiotics and the ISAPP definition, a list of frequently asked questions from scientific
 meetings, public forums and personal communications was compiled during 2023 and published shortly after
 the end of the year. The paper addresses questions on the rationale, scope, wording, mechanism of action
 and commercial implementation as well as expectations for safety, quality and efficacy data.
 - o Publication: Frequently asked questions about the ISAPP postbiotic definition
 - o Press release: Scientists address debates on postbiotic definition with new paper
 - Related blog post: Clarifying the role of metabolites in the postbiotic definition
- Criteria for use of the term prebiotic. While a definition for prebiotics is well-established, technologies to elucidate their effects on both the host and microbiome have undergone significant advancements in recent years, challenging past assumptions about study designs and methodologies which may be required to demonstrate prebiotic properties. Prompted by industry member feedback, an expert team was assembled to delineate specific criteria to meet the prebiotic definition, with reference to substance characterization, clinical and mechanistic endpoints and potential methodologies. The manuscript is currently undergoing peer review.
- Fermented foods: a perspective on their role in delivering biotics. A group of experts convened at the 2022 ISAPP annual meeting in Spain discussed the intersection of fermented foods and biotics substances (including probiotics, prebiotics, postbiotics and synbiotics) concepts which are frequently conflated. The outputs of these discussions were published in a 2023 perspective article.
 - Publication: Fermented foods: a perspective on their role in delivering biotics.
- Emerging issues in probiotic safety: 2023 perspectives. A review originating in a 2022 ISAPP discussion
 group explored whether emerging evidence raises any new safety concerns for probiotics. The paper provides
 a comprehensive list of potential probiotic risks, along with recommendations for assessing whether a given
 probiotic product is safe.
 - Publication: <u>Emerging issues in probiotic safety: 2023 perspectives</u>
 - o Press release: Experts examine the safety of probiotics
- Postbiotics in the medical field under the perspective of the ISAPP definition: scientific, regulatory, and marketing considerations. Involving a collaboration between several ISAPP board members with industry and regulatory scientists, this perspective paper explores the application of postbiotics for pharmaceutical uses, including medicines and medical devices. With a focus on the European regulatory framework, the implications of the postbiotic concept for manufacturing standards, toxicology and safety studies, application to novel species and marketing considerations are examined, as well as exploring research on postbiotics for medicinal applications via oral, skin and vaginal administration.
 - Publication: <u>Postbiotics in the medical field under the perspective of the ISAPP definition: scientific, regulatory, and marketing considerations</u>

- Probiotics in the neonatal intensive care unit—a framework for optimizing product standards. While significant clinical evidence shows certain probiotics reduce the risk of necrotizing enterocolitis & mortality for preterm infants, some healthcare professionals are hesitant to recommend probiotics because of safety concerns. This paper, originating from an ISAPP discussion group on probiotic safety, outlines a path forward to optimize the safety of probiotic products for the neonatal population involving collaboration between clinicians, pharmacies, and probiotic manufacturers and distributors.
 - Publication: <u>Probiotics in the Neonatal Intensive Care Unit—A Framework for Optimizing Product</u>
 Standards
 - o Press release: Realizing the benefits of probiotics in the neonatal intensive care unit
- Positive health outcomes associated with live microbe intake from foods, including fermented foods. Work to progress the science behind live dietary microbes continued in 2023 with the publication of some of the first real-world evidence that higher consumption of live microbes may promote health. This interrogation of the NHANES database linked consumption of foods containing live microbes with several biomarkers of health, including blood pressure, BMI, blood plasma glucose and waist circumference.



- Publication: <u>Positive Health Outcomes Associated</u>
 <u>with Live Microbe Intake from Foods, Including Fermented Foods, Assessed using the NHANES</u>
 Database
- o Press release: Evidence for the health benefits of consuming more live microbes

For more of ISAPP's published outputs, see a full list of peer-reviewed papers here.

Clinical practice guidelines

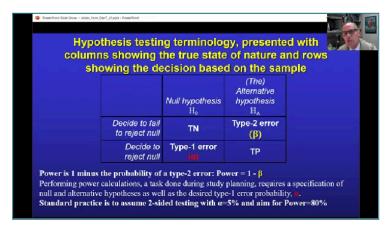
- WGO Practice Guideline on Probiotics and Prebiotics. ISAPP board members served as co-chairs and reviewers for the 2023 update of the World Gastroenterology Organisation global practice guidelines for the use of probiotics and prebiotics in gut health and disease. The "WGO Practice Guideline. Probiotics and Prebiotics" provides specific information on interventions that may have benefits for various GI conditions. The scope of its recommendations encompassed probiotics or prebiotics found in at least one randomized, controlled trial showing benefit.
 - o Publication: <u>Probiotics and Prebiotics</u>
 - Press release: <u>New resource for gastroenterologists on using probiotics and prebiotics in clinical practice</u>
 - o Blog post: New global guidelines for probiotics and prebiotics for gut health and disease
- Highlights of these guidelines were shared by current and former ISAPP board members Hania Szajewska,
 MD, PhD and Francisco Guarner, MD, PhD, in this clinician resource video produced by Consultant360 in September 2023.
 - o Resource: <u>Updates to the Probiotics</u>. <u>Prebiotics WGO Guidelines</u>

Stewardship

- Misinformation on biotics. In April, ISAPP published a blog post responding to three high-profile pieces
 found recently in the popular media. While these media items acknowledged the availability of evidence
 linking probiotics to human benefits, they misconstrued potential harms from probiotics and sowed confusion
 about what 'biotic' substances really are.
 - Blog post: <u>Popular media, misinformation and 'biotics'</u>
- Probiotic Administration in Preterm Infants. In October, ISAPP provided a timely response to a fatal case of
 probiotic-linked bacteremia in a preterm infant and the resulting FDA warning, which was widely covered in
 the media. ISAPP released a statement, signed by board members as well as Dr. Geoffrey Preidis MD PhD
 and Prof. Andi L Shane MD MPH MSc, making clear the scientific perspective on probiotic use in preterm
 infants.
 - o Scientific statement: Probiotic Administration in Preterm Infants: Scientific Statement
- **Postbiotics.** ISAPP board members, in particular Dr. Gabriel Vinderola PhD, participated throughout the year in further stewardship activities around postbiotics, participating in panel discussions, debates and delivering lectures. This blog post provides highlights of ISAPP postbiotic related activities in 2023.
 - o Blog post: Postbiotics: debate continues and the ISAPP definition gains support

Webinars

Clinical trial design for the biotics. In April, ISAPP held a member-only webinar on the topic of clinical trial design for the biotics, featuring talks by Prof. Dan Merenstein MD and Prof. Dan Tancredi PhD. The speakers covered tips on designing high-quality clinical trials and statistical considerations to optimize clinical trial validity and utility. Members can watch the webinar and subsequent Q&A on demand on the



Additional open access webinar content from ISAPP can be viewed here.

Organizational collaborations

member-only content page.

- Collaboration with the Institute for the Advancement of Food and Nutrition Sciences. Throughout 2023, Dr. Mary Ellen Sanders PhD and subsequently Marla Cunningham, represented ISAPP on the IAFNS Nutrition for Gut Health Committee. Comprising industry, government, non-profit association and academic experts, the Nutrition for Gut Health committee identifies priorities for the development and translation of nutrition and gut health research for actionable insights in the food industry.
 - o Resource: Nutrition For Gut Health IAFNS
- Collaboration with HealthFerm. In 2023 ISAPP participated as a member of the stakeholder board of the HealthFerm project. This research initiative, funded by the EU and Switzerland, focuses on better

understanding of the interactions between food fermentation microbiomes, fermented plant-based foods, the human gut microbiome and human health.

- Blog post: <u>Food of the future: Fermented and sustainable</u>
- Collaboration with Gut Microbiota for Health. As a representative of ISAPP, Dr. Mary Ellen Sanders PhD served on the Board of Experts during the first half of 2023 for the Gut Microbiota for Health (GMFH) platform, whose mission is to share knowledge and promote debate regarding gut microbiota.
 - o Resource: Gut Microbiota for Health
- Collaboration with United States Pharmacopeia. Advocating for improved probiotic quality. Dr. Mary Ellen
 Sanders PhD served as chair of the Expert Panel on probiotics for the United States Pharmacopeia (USP),
 working with industry and government scientists and USP staff to develop quality standards for probiotic
 supplements.

Awards



- The Glenn Gibson Early Career Researcher Award commends a researcher who is no more than five years past their terminal degree, making significant contributions in the biotics field at an early stage in their career. The 2023 award went to Dr. Paul Gill, PhD, Research Fellow at University College London, UK. Dr. Gill spoke at the ISAPP meeting in Denver, on his work investigating links between diet and the immune system, with a particular focus on short-chain fatty acids and fermented foods.
 - Website: The Glenn Gibson Early Career Researcher Award

In 2023, ISAPP also launched two new awards to promote scientific excellence in the biotic fields.

- The Sanders Award for Advancing Biotic Science is inspired by the leadership of ISAPP's longtime Executive Science Officer and founding President, Dr. Mary Ellen Sanders PhD. The award aims to recognise exceptional dedication and excellence in the biotics field through research, facilitation of new initiatives, scientific communication and stakeholder engagement, or other activities. The award was established in June 2023, with thanks to the generous support of many ISAPP industry members. Nominations were received throughout the second half of 2023 for announcement of the inaugural winner in 2024.
 - Website: The Sanders Award for Advancing Biotic Science
- The Gregor Reid Award for Outstanding Scholars in Developing Nations honors the work of Dr. Gregor Reid PhD, founder of the ISAPP Students and Fellows Association (SFA) as well as a founding board member of ISAPP. The aim of this award is to recognize and support early career researchers (students and fellows) within low and middle income countries (LMICs), echoing Dr. Reid's commitment to student development as well as community empowerment and probiotic science in LMICs. The inaugural award launched for applications in August 2023, with the first winner to be announced in 2024.
 - Website: The Gregor Reid Award for Outstanding Scholars in Developing Nations

Attendees at the 2024 ISAPP meeting in Cork, Ireland, will be able to hear the 2024 winners of these three awards talk about their work.

Board member videos

- Get to know the ISAPP board. In an initiative led by Senior IAC representative Dr. Mariya Petrova PhD, ISAPP board members recorded short video Q&As about their careers and areas of expertise to help members get to know them. The videos are available to view by ISAPP members only.
 - o Website: Content for members only

Translational resources

Infographics and videos. ISAPP maintains a suite of infographics and short videos designed to translate complex scientific concepts into visually engaging, informative and easy-to-understand summaries. The infographics and videos find their use in many forums, including scientific, educational and general public uses. In 2023, ISAPP produced the following new translational tools:



o Infographic: Live Dietary Microbes

Video: What is a postbiotic?

Thanks to the kind assistance of volunteer translators in the ISAPP community, ISAPP has 90 versions of infographics translated into other languages, adding Korean and Mombu to the list in 2023.



- ISAPP produced 16 episodes of the Science, Microbes & Health podcast in Season 2 this year, spanning many facets of research on probiotics, prebiotics, synbiotics, postbiotics, fermented foods, microbial ecosystems and microbe:host interactions across body sites and systems.
 - Episodes are posted on our <u>website</u>. You can also find the podcast on your favorite podcast app.

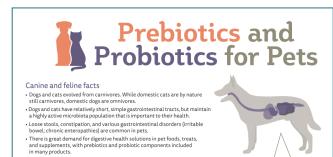
Blogs



• 18 ISAPP blog posts were published this year. ISAPP SFA has also published 4 blog posts written by their members.

 Website: ISAPP <u>Science Blog</u> and <u>Consumer Blog</u>

o Website: SFA Blog



Newsletters

- ISAPP produced two monthly newsletters throughout 2023:
 - The general newsletter shares news of ISAPP latest public releases, incl. publications, blogs, podcasts, awards, community resources and open access events.
 - ISAPP newsletter archive
 - The industry member newsletter provides member-specific news and updates, opportunities for participation, as well as member-only events and resources.
 - ISAPP member newsletter archive (password protected)

Social media

• ISAPP actively engages with the community on multiple social media channels, sharing news and updates throughout the year. ISAPP social media pages can be found on the following links: X (Twitter), Instagram, Facebook, and LinkedIn.



ISAPP thanks all members of our community for their contributions, support, engagement and collaboration throughout 2023. We look forward to a productive year ahead together in 2024.

Appendix A: ISAPP Board of Directors 2023



Prof. Daniel Merenstein MD, President
Director of Research of Family Medicine
Professor of Family Medicine
Georgetown University Medical Center, Washington
DC, USA



Prof. Seppo Salminen PhD, Past-President Professor, Director, Functional Foods Forum University of Turku, Finland



Prof. Daniel Tancredi PhD, Treasurer Professor, Department of Pediatrics University of California, Davis, USA



Prof. Kelly Swanson PhD, Member-at-Large
Department of Animal Sciences and Division of
Nutritional Sciences
Professor, Department of Veterinary Clinical Medicine
University of Illinois at Urbana-Champaign, USA



Prof. Maria Marco PhD, Vice-PresidentDepartment of Food Science and Technology
University of California, Davis, USA



Dr. Gabriel Vinderola PhD, Secretary
Associate Professor of Microbiology
Faculty of Chemical Engineering, National University of
Litoral
Principal Researcher, CONICET
Santa Fe, Argentina



Prof. Karen Scott PhD, Member-at-Large Professor, Rowett Institute University of Aberdeen, Scotland, UK



Prof. Colin Hill PhD, DSc, Member-at-Large Professor of Microbial Food Safety Microbiology Department University College Cork, Ireland



Prof. Sarah Lebeer PhD, Member-at-Large
Professor in Microbiology and Molecular Biology
Department of Bioscience Engineering
University of Antwerp, Belgium



Prof. Hania Szajewska MD, PhD, Member-at-Large Professor, Department of Paediatrics The Medical University of Warsaw, Poland



Prof. Kristin Verbeke, Pharm, PhD,
Member-at-Large
Professor, Translational Research in Gastrointestinal
Disorders
Katholieke Universiteit Leuven, Belgium



Dr. Mary Ellen Sanders, Executive Director (January - April) ISAPP Centennial, Colorado USA



Prof. Eamonn Quigley MD, Member-at-Large
Professor, Division of Gastroenterology and
Hepatology
The Methodist Hospital and Weill Cornell School of
Medicine, Houston, Texas USA



Dr. Anisha Wijeyesekera PhD, Member-at-LargeAssociate Professor Food Microbial Sciences Unit
Department of Food & Nutritional Sciences
University of Reading, UK



Marla Cunningham, Executive Director (April - December) ISAPP Brisbane, Australia

Appendix B: ISAPP Member Organisations 2023

ISAPP thanks all members for their support of ISAPP in 2023.



























































































































- **Abbott Nutrition**
- **ADARE Biome**
- **ADM Protexin**
- Amway
- Ardent Mills
- Atlantia Food Clinical Trials Ltd.
- Bayer
- Beneo
- Biocodex
- Glac Biotech Co.,Ltd
- BioGaia AB
- BioZyme Inc.
- Cargill
- Chr. Hansen
- Clasado Inc.
- The Clorox Company (Renew Life)

- Ingredion Incorporated
- Inner Mongolia Shuangqi Pharmaceutical Co., Ltd (Wedge)
- Kerry
- Kraft Heinz Company
- Kyowa Hakko
- Lesaffre International
- Mars, Incorporated
- Metagenics
- Microba
- Mondelez
- Morinaga Milk Industry Co., Ltd.
- National Dairy Council
- Nestlé Research
- Nestlé Research Product Technology & Development
- Novozymes A/S

- Comet Bio
- CP Kelco
- Danone EDP
- Danone North America
- Deerland Enzymes & Probiotics
- Symrise (Diana Nova)
- Diprobio (Shanghai) Co., Limited
- DSM/i-Health
- Eurofins Microbiology Laboratories, Inc.
- Evolution Health
- Fonterra
- Friesland Campina Innovation Center
- General Mills / Yoplait
- Haleon
- H&H Group
- IFF (Danisco)

- Pepsico
- Pharmavite LLC
- Probi
- Procter & Gamble
- Puratos
- Roquette
- Sanofi
- Seed Health
- Sensus BV
- SweetPro LLC
- Synbiotic Health, Inc
- Tate & Lyle
- TNO
- Verb Biotics LLC
- Winclove BV
- Yakult Honsha Co.



2023 ISAPP Gala, History Colorado Center