

Call for Proposals

No. 60

3 July 2024

Priority Programme “Illuminating Gene Functions in the Human Gut Microbiome” (SPP 2474)

In March 2024, the Senate of the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) established the Priority Programme “Illuminating Gene Functions in the Human Gut Microbiome” (SPP 2474). The programme is designed to run for six years. The present call invites proposals for the first three-year funding period.

Scientific Programme

Bacteria are ubiquitous and have shaped the earth’s history for billions of years – impacting every ecosystem on this planet. Yet it is only through sequencing efforts in the last couple of decades that we have begun to appreciate the tremendous diversity of bacterial species that colonise every corner of this planet. Most of these species are *terra incognita* – they are full of new genetic material and look nothing like the model species microbiologists have been using for decades. This knowledge gap also applies to microbial ecosystems that are part of the human body and are intimately linked to our health, such as the human gut microbiome. It is currently estimated that approximately 4,500 different bacterial species can colonise the human gut (with 250–500 species found in each individual), 70% of which have not been cultured in isolated form. Up to 50% of their genomic material is of unknown function. Although we are aware of the importance of these gut bacteria for human health, we know little about their biology. Understanding the unexplored functions of genes in human gut bacteria and their organisation into pathways is vital if we want to go beyond descriptive associations of the gut microbiota with human health and map the causal mechanisms, thereby unlocking its potential for therapeutic applications.

The proposed Priority Programme will focus on abundant and important bacterial members in the healthy human gut microbiome and promote functional microbiome research by addressing three core aspects of their biology. We seek to:

- i) define uncharacterised cellular structures and functions of these non-model organisms,
- ii) explore their abilities to produce and process new metabolites and
- iii) study their interactions with their environment.

Research Areas

Projects to be funded must address one of the following biological aspects, with the aim of using novel technologies to elucidate unknown gene functions of a variety of non-model microorganisms of the human gut.

- i) Cellular structures and functions of non-model human gut microbial species, including the study of surface-exposed complexes, receptors and membrane transporters and the development of new genetic toolkits to make them more accessible for genetic studies.
- ii) Capacities to produce or process metabolites, with a focus on secondary metabolites and biosynthetic gene clusters, food and drug (or other xenobiotic) metabolism.
- iii) Sensing of, interacting with and adapting to their surroundings, including intra/interspecies interactions and responses to changing environments.

SPP projects should primarily focus on key members of the human gut microbiome, such as *Phocaeicola* spp. (e.g. *P. vulgatus*), *Bacteroides* spp. (e.g. *B. uniformis* and *B. thetaiotaomicron*), *Segatella* spp. (formerly *Prevotella* spp. – e.g. *P. copri*), *Bifidobacterium* spp. (e.g. *B. adolescentis*), *Fusobacterium* spp. (e.g. *F. nucleatum*), *Desulfovibrio* spp. (e.g. *D. piger*) and *Eubacteriales* from the genera *Roseburia* (e.g. *R. intestinalis*), *Ruminococcus* (e.g. *R. bromii*) or *Clostridium* (e.g. *C. perfringens*). Model communities should contain a certain level of complexity (at least 7 species) and several of the aforementioned species/genera or alternatively take advantage of already established models, such as the Simplified Human Intestinal Microbiota (SIHUMI) or the Oligo-Mouse Microbiota (Oligo-MM).

Criteria for Proposals

Successfully accomplishing the goals of this Priority Programme requires innovative new approaches in genetic engineering, biochemistry, systems-based microbiology, structural and computational biology and applications of artificial intelligence in biology. To ensure conceptual coherence and encourage collaboration within this programme, projects need to adhere to the following essential criteria:

- There should be a clear focus on unravelling gene function and organisation in prominent and important human gut microbes – these functions should relate to key aspects of the biology of these organisms, especially concerning the three biological areas defined above.
- SPP projects should concentrate on prominent bacterial species within the human gut microbiome and ideally focus on one of the key species/communities of this SPP. Projects on well-studied bacteria (*E. coli*, *B. subtilis*) or ‘classical’ pathogens (i. e., ESKAPE and gastrointestinal pathogens such as *Salmonella*, *Shigella*, *Listeria*, *Helicobacter*, *Campylobacter*), viruses, fungi, archaea or eukaryotic parasites are excluded.
- The methodologies employed in SPP projects should go beyond a mere description of microbiome compositions and links to health or diseases. Descriptive omics studies that do not focus on characterising the microbial gene functions behind any observed effects are outside of the scope of this call.

The development of new methods, tools and resources required for tackling the biology of such understudied organisms is a central aim of the Priority Programme. Hence, collaborative projects that combine technology development with molecular microbiology are explicitly invited to foster interdisciplinary innovation. Individual projects, however, can also be submitted.

Proposals and CVs must be written in English and submitted to the DFG by **8 January 2025**. Please note that proposals can only be submitted via elan, the DFG’s electronic proposal processing system.

Applicants must be registered in elan prior to submitting a proposal to the DFG. If you have not yet registered, please note that you must do so by **16 December 2024** to submit a proposal under

this call; registration requests received after this date cannot be considered. You will normally receive confirmation of your registration by the next working day. Please note that you will be asked to select the appropriate Priority Programme call during both the registration and the proposal process.

Applicants who already have an elan account are requested to check their data in elan. If necessary, you can update your data directly in the portal. It is not necessary to register again.

Proposals must be submitted within the framework of the coordinated funding call. Please select *Proposal Submission – New Project – Priority Programmes* and select “SPP 2474” from the current list of calls. Proposals cannot be submitted after the deadline has expired.

All submitted proposals will be evaluated by a review panel in the course of a colloquium with oral project presentations by the principal investigators, which is anticipated to take place on **14–15 May 2025** at the Gustav-Stresemann-Institut in Bonn.

The envisaged start of funding is September 2025.

When preparing your proposal, please review the programme guidelines (DFG form 50.05, section B) and follow the proposal preparation instructions (DFG form 54.01) as well as the guidelines for preparing publication lists (DFG form 1.91).

Please note that only project proposals can be accepted that follow the current DFG templates and their specifications:

- For your project description, DFG form 53.01 applies.
- For all CVs incl. publication lists, DFG form 53.200 is mandatory.

These forms can either be downloaded from our website or accessed through the elan portal.

All principal investigators will receive further information in due course.

The DFG strongly welcomes proposals from researchers of all genders and sexual identities, from different ethnic, cultural, religious, ideological or social backgrounds, from different career stages, types of universities and research institutions, and with disabilities or chronic illness.

Further Information

For scientific enquiries, please contact the Priority Programme coordinator:
Professor Dr. Lisa Maier, Universitätsklinikum Tübingen, Institut für Medizinische Mikrobiologie und Hygiene, Elfriede-Aulhorn-Straße 5, 72076 Tübingen, Tel. +49 7071 2980187, l.maier@uni-tuebingen.de

The elan system can be accessed at:
<https://elan.dfg.de/en>

DFG forms 50.05, 54.01, 53.01, 53.200 and 1.91 can be downloaded at:
www.dfg.de/formulare/50_05
www.dfg.de/formulare/54_01
www.dfg.de/formulare/53_01_elan

www.dfg.de/formulare/53_200_elan
www.dfg.de/formulare/1_91

DFG's data protection notice on research funding:

Please note the DFG's data protection notice on research funding. If necessary, please also forward this information to those individuals whose data will be processed by the DFG due to their involvement in your project:

www.dfg.de/privacy_policy

Questions on the DFG proposal process can be directed to:

For questions regarding scientific aspects, please contact:

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For administrative and elan queries, please contact:

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