International Transmembrane Transporter Society

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Newsletter

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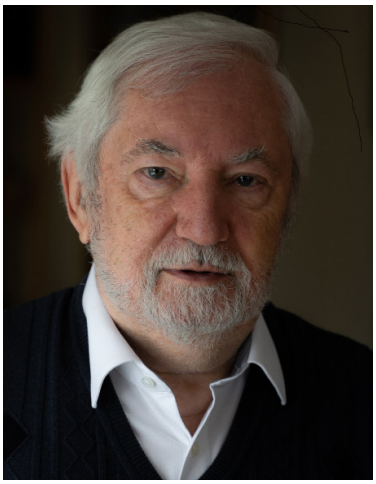
A Word from the President



Dear Colleagues,

This is my fourth and last letter as president of ITTS, and it is my great pleasure to acknowledge the immense success of the second ITTS Symposium, "Catching Transport in Motion", in Copenhagen, Denmark, June 7-10, 2022. Based on the fantastic work of the organizers, led by Prof. Claus J. Løland, the University of Copenhagen hosted a very successful "in person" Symposium (a great relief after COVID lock-down) for over 200 participants.

Thanks to the great work of the organizers, registration and hotel bookings went smoothly, and the scientific program was indeed excellent. According to the tradition of this Society, great keynote lectures by Rob Edwards, UC San Francisco ("Endocytic recycling mechanism dictates the mode of neurotransmitter release") and by Randy Blakely, Florida Atlantic University ("Fundamental and pathophysiological regulation of serotonin transporters"), focused on transporters of the nervous system. Several symposia ("New kids on the monoamine transporter block - Implications for treatment of psychiatric and substance use disorders", "Structure and function of the GABA transporter subfamily", "SLC38 transporters in neurotransmission and their regulation", "Molecular mechanisms of Na-coupled neurotransmitter transport", "Emerging roles for transporters in dopamine dysfunction in CNS disorders"), have also targeted this area, while, according to the goals of ITTS, discussions on other transporters significantly increased the scope of this Society. Thus, separate symposia presented and discussed new, emerging areas of "transportology", with titles including "Structural and functional dynamics of transporters", "Cancer metabolism – shaping metabolic flux through membrane transport", "Lipid gymnastics - Highlights on lipids translocation mechanisms".

For the numerous young participants, successful poster presentations and poster discussions were organized, and, in addition, a special session was dedicated for oral presentation by young scientists. Special awards honored the most interesting and best presented posters of young scientists. All and all, this ITTS Symposium clearly demonstrated the increased significance of the transporter field, reinforced international connections and showed the need for personal interactions in scientific research.

Again, many thanks to the organizers!

During the Copenhagen Symposium, we managed to hold an open ITTS Executive Committee meeting, discussing the future of our Society and the organization of following ITTS Symposia. Offers for organizing future Symposia were discussed, and we had a suggestion that even in 2023 we could have such a meeting in Norway, organized by Professor Chaudry. However, based on this Society meeting and the online discussions of the committee – while thanking Prof. Chaudry for his gracious offer and encouraging him to organize a future meeting in Norway - we have decided not to have an ITTS Symposium in 2023, while focusing on the proper organization of our next Symposium to be held in 2024, potentially outside Europe.

Conferences in 2023, in which ITTS members could and should actively participate, include (see pages 6 & 10 of this Newsletter) an ABC transporter Meeting in Innsbruck, Austria, February 26 - March 3 (ABC2023, https://abc-meeting.org/), and a transporter-related Gordon Conference in Texas, USA (GRC Multi-Drug Efflux Systems, March 26 - 31, 2023, https://www.grc.org/multi-drug-efflux-systems-conference/2023/). I also call your attention to the "World Congress of Basic & Clinical Pharmacology, 2023" to be held in Glasgow, Scotland, UK, July 2-7, 2023 (see https://wcp2023.org/), in which the pharmacology of membrane transporters is planned to be a key topic.

As the outgoing president of ITTS I would like to welcome John Schuetz as incoming President, and the incoming Vice President, Renae Ryan, who takes John's place as VP, effective Jan 1. I take this opportunity to thank Sonja Sucic for her excellent work as ITTS secretary, and welcome the incoming secretary, Elena Bossi. I also thank Haley Melikian for her great work and for continuing this work as treasurer of our Society, as well as Lyn Daws for being a wonderful and very supportive immediate past president over the last two years.

Unfortunately, our everyday work as scientists and a Society is strongly affected by the Russian aggression and by now the long-lasting war against the Ukraine, resulting in millions of refugees and thousands of dead and wounded. The world-wide sanctions against Russia also cause an energy crisis all over Europe, and after the slowly decreasing COVID-19 pandemic, this situation is strongly hindering our scientific activities and communications again. Thus, at the end of 2022 and looking forward to 2023, we should make every effort to keep the ITT Society activities going, and as individuals, staying safe and healthy!

With best regards, and wishing Happy Holidays,

Balázs Sarkadi

ITTS president

ITTS

International Transmembrane Transporter Society

Not Sure of Your Membership Status?

Go to our secure website to check whether your membership is current: http://www.ittsociety.org/member-login

This newsletter was assembled by ITTS Secretary Sonja Sucic and Associate Councilor Lee Gilman.

Meet Our New Vice President

Prof. Renae Ryan
Vice President: 2023-2026
School of Medical Sciences
Faculty of Medicine and Health
University of Sydney, Australia

How would you recap your career path in a paragraph or two: any highlights you´d like to share with the ITTS bunch?

I completed my undergraduate studies at the University of Sydney and fell in love with transporters when I undertook a final year lab project in the laboratory of Rob Vandenberg. I completed my PhD in Sydney studying the dual functions of my favorite protein, the glutamate transporter that can act as both a transporter and a channel. After my PhD I moved to Columbia University to work with Eric Gouaux. This was a big leap for me as I had not done any biochemistry before and my time in NYC was amazing and challenging, both personally and professionally. Here, I worked closely with Olga Boudker on a bacterial homologue of the glutamate transporter family (GltPh) where we solved several structures and started to understand how these interesting transporters moved during the transport process.

In 2005, I moved to the National Institutes of Health to work with Joe Mindell where we developed some cool techniques to study the electrical properties of this bacterial transporter and discovered that GltPh also allows uncoupled chloride movement in a similar manner to the human glutamate transporters. I had such a great time during my postdoc years, working in stimulating environments and meeting people from all over the world, many of whom are now close friends and collaborators.

Since returning to the University of Sydney in 2007, I have established my own group that continues to focus on understanding the molecular mechanisms of membrane transport proteins. I collaborate with wonderful students, ECRs and scientist around the world to study a range of membrane transporters including neutral amino acid transporters, and transporters from the SLC6 family, such as glycine and dopamine transporters. I am interested in how disease-causing mutations alter the function of transporters and the role of nutrient transporters in cancer.

Past and present members of the Transporter Biology Group at the University of Sydney

Recently, we solved a novel structure of the glutamate transporters using cryo-EM which finally reveals how these transporters enter a chloride conducting state during the glutamate transport cycle. This work provides a crucial piece of information to map of the complete trans-

Meet Our New Vice President

port cycle shared by the glutamate transporter family revealing the link between the twisting elevator mechanism of transport and chloride channel activation (finally answering questions I have had since my PhD work!).

What would you say were the biggest challenges you´ve faced in your career?

There have been many challenges along the way, as there is for all of us. Although I loved science, I didn't have a lot of confidence in myself to pursue a career in science, in fact I was explicitly told I would not be successful and should think about doing something else when I finished my undergraduate degree. I have two beautiful daughters, now 12 and 9. The struggle to keep my career afloat in those years when they were young is a hard one many women and parents go through. Support from my wonderful family, friends and colleagues has been invaluable to me through the hard times. Strong networks are so important, but particularly when you are struggling or having a hard time.

Past and present members of the Transporter Biology Group at the University of Sydney

What would you like to convey to young researchers in the field?

Join our transporter community and work on the most interesting and varied membrane proteins! Seriously, my main advice is do what makes you happy. I know that sounds cliché, but if you love science and research, then follow your passion and get involved with ITTS.

Expand your networks and connect with people who inspire you. Ask them how they got to be where they are today – the good, the bad and the ugly. Write down your career goals, make (several) plans, regularly re-evaluate those plans, support your colleagues, and enjoy the journey.

Believe in yourself! You deserve to be here. Network widely, develop peer support networks, find people that believe in you and will sponsor you. And if it is not working where you are, try to move or find a way to change your path. Don't let 'de'mentors prevent you from succeeding or make your life miserable.

Any other things you´d like to share with the ITTS community?

I am really excited to take on the role of Vice President of ITTS and to work with the executive committee to grow our wonderful transporter community. I am passionate about improving equity, diversity, and inclusion to drive excellence in research and improve research culture and supporting the next generation of transporterologists.

Meet Our New Secretary

Prof. Elena Bossi

Secretary: 2023-2026

Department of Biotechnology and Life Sciences
University of Insubria, Italy

How would you recap your career path in a paragraph or two: any highlights you´d like to share with the ITTS bunch?

My research life started with lab work for my thesis in ecotoxicology at the European Joint Research Centre in Ispra- Italy. After my master's degree in Biology at the University of Milan, I worked in a company before starting my work in the Cellular and Molecular Physiology laboratory of Prof. Peres about ion channels. To learn Xenopus Laevis heterologous expression and molecular biology I spent some months at Tel Aviv University at the School of Medicine in the laboratory of Natan Dascal. When I was back in Italy with a good background in electrophysiology, molecular biology, and heterologous expression I had the opportunity to start my PhD about a very special member of SLC6 family: Manduca sexta msKAAT1 (an ortholog of SLC6A19), a very peculiar transporter and a fantastic tools to study structure-function - this was my pathway to the transport world. During my PhD, I spent some months in the laboratories of Heini Murer at The Institute of Physiology at the University of Zurich, where I worked with Ian Foster, to learn about the biophysical aspect of membrane transporters. In 2000 I became an assistant professor in physiology at the University of Insubria and in 2014 associate professor at the same university- Since 2014 I'm the coordinator of the Molecular and Cellular physiology group. Our work in membrane transporters was recently summarized in a paper "The "www" of Xenopus laevis Oocytes: The Why, When, What of Xenopus laevis Oocytes in Membrane Transporters Research".

Past and present members of the Bossi Lab at the University of Insubria

My team is a small group, with only three permanent members, but supported by smart PhD and master's students. This is a hard challenge for our group because every year we have new young researchers that need to learn lab life from the beginning, but it is also a great satisfaction to see how much and how some of these young people manage to grow scientifically and find their own position in the world of research. Outside the transport world, I 'm the coordinator of the bachelor's degree at the University of Insubria.

What would you say were the biggest challenges you´ve faced in your career?

A great and constant challenge is to work in Italy with many young researchers. I'm sorry to

Meet Our New Secretary

say it but my country is certainly not a nation that believes in young people and research, and consequently invests very little in it, so let's say that my profession as a researcher and teacher in a small university is a daily huge challenge.

What would you like to convey to young researchers in the field?

Maybe this question should be asked to my PhD students, they know better than me what I'm conveying to them. In my laboratory, the researchers, independently by level, work in a serene atmosphere, with the right combination of collaboration and competition for growing their research passions. I like to teach my own approach to science work and support ideas even if they seem crazy. I hope that the students who have worked in my laboratory (now there are many) have learned from me to be curious, to look deeply into things and to understand more and more but also to work hard (perhaps too much) to achieve their dreams and their goals. Moreover, I would like to suggest to young researchers that the transporters - whatever aspect is taken into consideration, from structure to function to pharmacology - are still a research field where to do interesting discoveries, so a very good field to grow as scientists.

Past and present members of the Bossi Lab at the University of Insubria

And…one last question to wrap it all up: any particularly adrenaline-packed events that you´ve experienced as a scientist (not necessarily paper-related)?

My first injection of cRNA and the subsequent discovery that it expressed a protein in the cell membrane that functioned as expected, like my first GFP-GAT1 transfection and the fantastic fluorescent cell edges after 48 hours. Even today after many many years, being able to make cells express what you want has a great charm for me.

Any other things you´d like to share with the ITTS community?

I am grateful for the opportunity to support the membrane transporter researcher's community which is a very positive environment as we have seen from the enthusiasm of the two June conferences and I'm proud to be part of it. I'm conscious of the importance of the ITTS society and the efforts needed to let it grow in the future years. I will try to continue the excellent work done by Sonja with insuperable passion these years I'll try to fill my role in the best possible way.

ABC Transporter Meeting

ATP-Binding Cassette (ABC) Proteins: From Multidrug Resistance to Genetic Disease
February 26 - March 3, 2023 at the AC Hotel Mariott, Innsbruck, Austria

Open Position - Postdocs

Computational biophysics lab at the Department of Physiology and Biophysics at Weill Cornell Medicine in New Your City is seeking talented and highly motivated postdocs with outstanding research credentials. The overall scientific goal of the research projects in the lab is to uncover dynamic and allosteric mechanisms of cell surface proteins in fundamental biological processes using combination of computer simulations and Artificial Intelligence/Machine Learning approaches. The mechanistic knowledge we seek guides translational aims related to rational drug design. Current projects focus on various transmembrane protein families (G-protein coupled receptors, transporters, and Ca2+-activated ion channels and lipid scramblases) as well as soluble enzyme proteins.

The research questions we pose are addressed with a variety of quantitative methods of computational biophysics and structural biology in projects integrated with biophysical measurements and molecular cell biology experimentation. The computational approaches include a broad spectrum of molecular modeling and molecular dynamics simulations, the development and application of various new methods for enhanced sampling and free energy calculations. Trajectory analyses are carried out with established methods such as Markov State Models, allostery quantification (e.g., NbIT and TCF), and a variety of Artificial Intelligence/Machine Learning approaches. These are used in multiscale approaches from continuum level theory of membrane elasticity to kinetic models at atomic resolution, membrane-mediated dynamics, and protein-protein interactions.

The required qualifications include:

- Ph. D. degree in Physics, Chemistry, Biophysics, Theoretical or Computational Chemistry, Computational Biology, or related discipline.
- Strong background in computational biology and HPC computing.
- Strong background in molecular dynamics simulations of protein-membrane systems (from setting up and running a molecular system to carrying out analyses on the trajectory) and in aspects of molecular docking and homology modeling.
- Knowledge of advanced enhanced sampling techniques and of computational methods for free energy calculation from molecular dynamics simulations.
- Knowledge of machine learning approaches.
- Strong programming skills and analytic abilities.

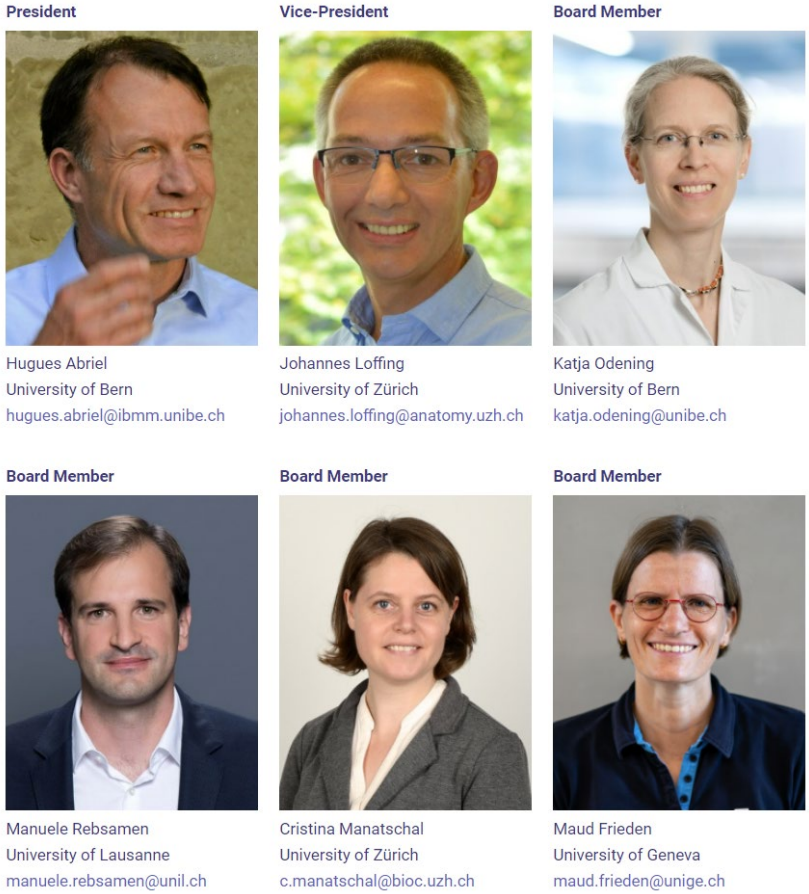
Qualified applicants should send a CV and at least 2 reference letters by email to the lab PI , George Khelashvili at gek2009@med.cornell.edu. Applications will be considered until the position is filled.

New Life Sciences Switzerland Section

LS2 Life Sciences Switzerland Ion Channels and Membrane Transporters

Swiss Scientists create a new Ion Channels and Membrane Transporters Section

The "Ion Channels and Membrane Transporters" section was recently created within the Life Sciences Switzerland network framework LS2.



The discipline of physiology and, in particular, membrane transport biology has a long history in Switzerland. Motivated by this strong history of membrane transport research, six scientists (see figure), under the lead of the two current National Centers of Competence in Research (NCCR) directors –Jan Loffing (Kidney.ch) and Hugues Abriel (TransCure)– launched in February 2022 a new section, «Ion Channels and Membrane Transporters » under the Life Science Switzerland (LS2) umbrella organisation. This section aims to keep this multidisciplinary community alive and organise scientific symposia at the yearly LS2 meetings (i.e. the next one will be held in Zürich on Feb. 16-17, 2023). Its explicit goal is to work in synergy with the other LS2 sections since much research on membrane transport proteins is part of physiology, cell biology, biochemistry, biophysics, and structural biology pharmacology.

A Huge Thanks to Sonja Sucic

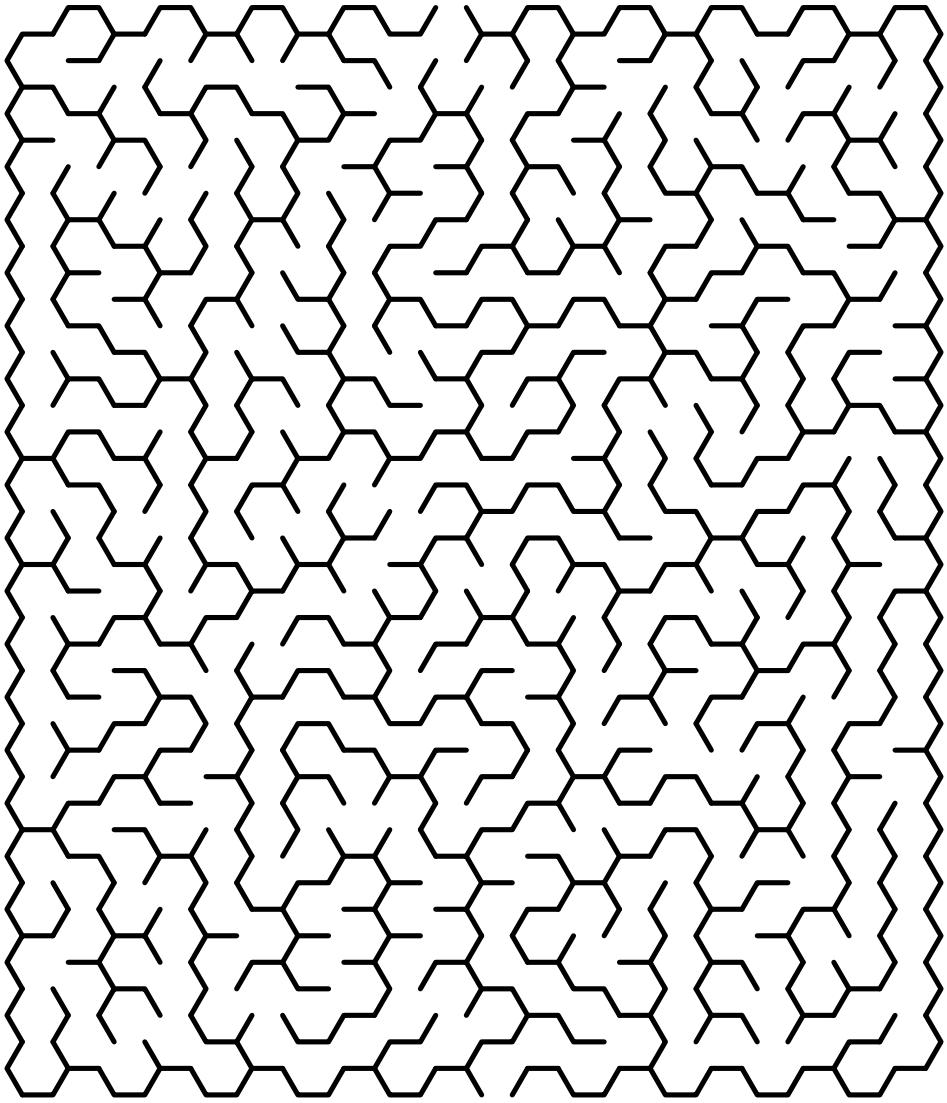
We want to express our tremendous gratitude to Sonja Sucic for serving as Secretary of ITTS. Her hard work, enthusiastic communication, and excellent organization have helped ITTS keep in close contact these past four years, particularly during the pandemic. Sonja has also been instrumental in assembling all materials for every newsletter. Without her, we would not have all of this excellent content, nor such enjoyable inclusions such as the Transporter Fun Corner (below).

Thank you from all of us, Sonja!!

Transporter Fun Corner

The Translocation Pathway

Substrate in here



Made it!

Gordon Research Conference

Multi-Drug Efflux Systems

Targeting the Mechanisms and Regulation of Transporters for Advancing Health During a Pandemic

March 26-31, 2023

Galveston, Texas, United States

Student and Post-Doctoral ITTS Chapters Welcome

ITTS welcomes applications for local Chapters of ITTS, comprised of students and post-doctoral fellows. To form a Chapter, have your mentor nominate you as leader of that Chapter, and provide assurance of your rank, good academic standing, and commitment to the ITTS. Please also provide a name for your Chapter. Annual dues for Chapter members is only $10, and paid by your mentor (with their blessing, of course). Chapter members will receive a member card, and have this as a valuable addition to their curriculum vitae. ITTS Chapters will be evaluated annually for their contributions to the society. The role of Chapters is to encourage active involvement with the ITTS through local outreach events, and attracting new members. Inactive Chapters, as deemed by the ITTS Executive Committee and Council, will be disbanded.

Please send applications to ITTS secretary, Elena Bossi at Elena.Bossi@uninsubria.it

World Congress of Basic & Clinical Pharmacology 2023

Member News

Publications from Sitte Lab

Mayer FP, Niello M, Cintulova D, Sideromenos S, Maier J, Li Y, Bulling S, Kudlacek O, Schicker K, Iwamoto H, Deng F, Wan J, Holy M, Katamish R, Sandtner W, Li Y, Pollak DD, Blakely RD, Mihovilovic MD, Baumann MH, Sitte HH. **Serotonin-releasing agents with reduced off-target effects**. ***Mol Psychiatry*** (2022) Epub ahead of print

Khanppnavar B, Maier J, Herborg F, Gradisch R, Lazzarin E, Luethi D, Yang JW, Qi C, Holy M, Jäntsch K, Kudlacek O, Schicker K, Werge T, Gether U, Stockner T, Korkhov VM, Sitte HH. **Structural basis of organic cation transporter-3 inhibition**. ***Nat Commun*** (2022) 7;13(1):6714

Publications from Gilman Lab

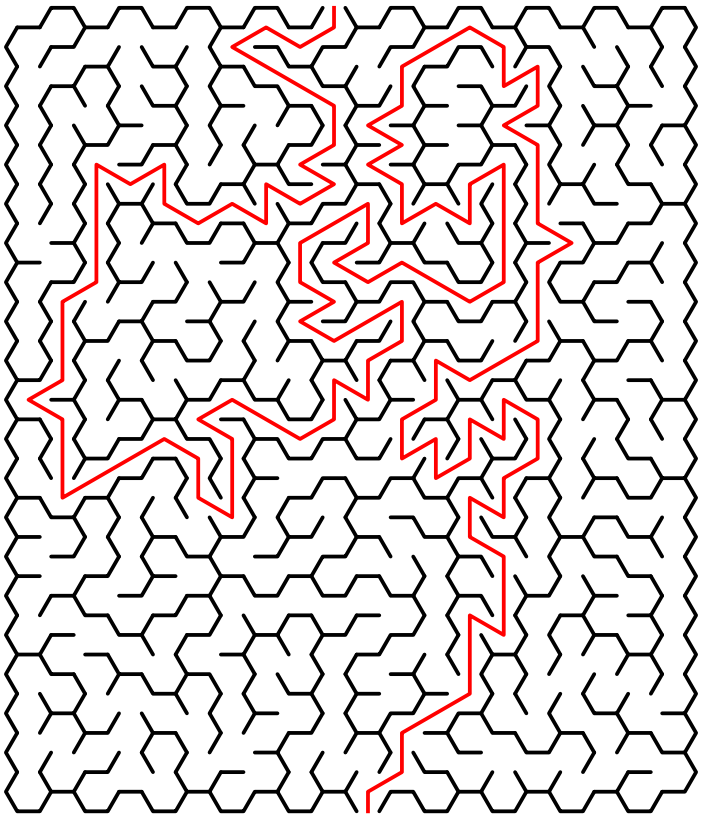
Weber BL, Beaver JN, Gilman TL. **Summarizing studies using constitutive genetic deficiency to investigate behavioural influences of uptake 2 monoamine transporters**. ***Basic Clin Pharmacol Toxicol*** (2022) Epub ahead of print

Beaver JN, Weber BL, Ford MT, Anello AE, Kassis SK, Gilman TL. **Uncovering functional contributions of PMAT (Slc29a4) to monoamine clearance using pharmacobehavioral tools**. ***Cells*** (2022) 9;11(12):1874.

Open Positions & Job Announcements

The ***Jobs Corner*** on our ***News*** page of the ITTS website serves as a convenient platform for group leaders to announce open positions in their labs and institutions, for researchers at various stages of their career (PhD, Postdoc and beyond). Should you like to post a job opening, please send an email to Elena Bossi (Elena.Bossi@uninsubria.it).
http://www.ittsociety.org/new-page

Transporter Fun Corner Solution



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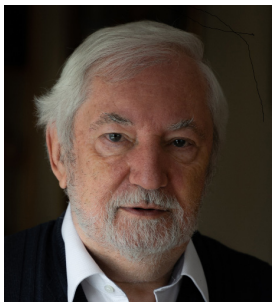
ITTS Executive Committee



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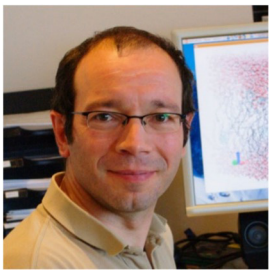

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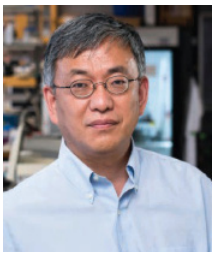

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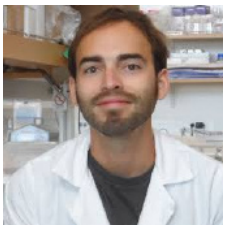

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