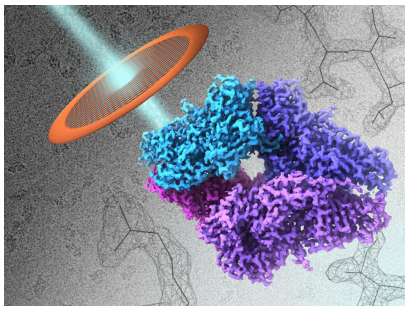
**Created in October 2024 by Prof. Arnaud Vanden Broeck within the Integrative Biological Sciences and Centre for Protein Engineering (InBioS – CIP) research units at the University of Liège, the Laboratory of RNA Structural Biology and Biochemistry (RSBB) explores the fascinating world of divergent molecular machines through cryogenic electron microscopy (cryo-EM). With a dual focus on human health and evolutionary structural biology, the lab aims to uncover how unique RNA processing pathways operate in parasites and what they reveal about the diversity of gene expression mechanisms across eukaryotes.**

Headed by Prof. Vanden Broeck, Principal Investigator and FNRS Research Associate, the laboratory currently includes a PhD student and a postdoctoral researcher, with the team expected to double by early 2026. Supported by two major sources of funding: a five-year ERC Starting Grant and a two-year FNRS MISU grant – the lab benefits from a budget of €2.5 million in public funding to kickstart its research activities.



Prof. Arnaud Vanden Broeck, head of the RSBB Lab. © Arnaud Vanden Broeck

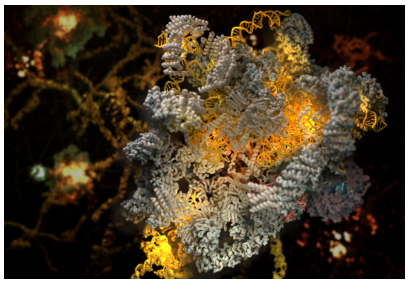


Artistic illustration of density map of a protein complex determined by cryo-electron microscopy. © Veronica Falconieri, Sriram Subramaniam – NIH-NCI

Prof. Vanden Broeck trained as a structural biologist at the University of Strasbourg and

later spent six years as a postdoctoral fellow at Rockefeller University in New York. There, he studied the human ribosome, the protein-synthesizing factory of cells, using cryo-EM and genome editing. His research unveiled the early stages of ribosome assembly and how defects in this process contribute to cancer and rare developmental disorders called ribosomopathies. Upon returning to Belgium, Prof. Vanden Broeck broadened his focus to include kinetoplastid parasites such as *Trypanosoma* and *Leishmania*, which cause neglected tropical diseases transmitted by insects. These organisms use highly unusual gene expression pathways, providing a unique opportunity to understand both disease mechanisms and molecular evolution.

Thanks to ERC funding, the lab is currently investigating RNA trans-splicing, a process that fuses two separate RNA molecules to generate mature messenger RNAs—a hallmark of kinetoplastid biology. This process is carried out by the trans-spliceosome, a large ribonucleoprotein complex that the team aims to reconstruct in 3D at atomic resolution using cryo-EM and AI-based interactomics. By capturing its successive functional states, the goal is to uncover potential therapeutic targets and shed light on how molecular complexity evolves in divergent eukaryotes.



Artistic illustration of human SSU processome escaping from the nucleolus. © Arnaud Vanden Broeck



Artistic illustration of E. coli DNA gyrase engaging in DNA supercoiling. © Arnaud Vanden Broeck

Among Prof. Vanden Broeck's publications, two are considered seminal in the ribosome field: Singh S, Vanden Broeck A, et al. *Science* 373, eabj5338 (2021); and Vanden Broeck A & Klinge S. *Science* 381, eadh3892 (2023). These studies revealed the first atomic-resolution structures of human nucleolar ribosome precursors and earned him two prestigious American awards in 2024—the RNA Society/Scaringe Young Scientist Award and the Blavatnik Regional Award for Young Scientists—in recognition of his contributions to the field of RNA biology.

Now based in Liège, Prof. Vanden Broeck continues to collaborate internationally, including with Dr Elizabeth Wasmuth (University of Texas Health San Antonio, USA), a cryo-EM expert in the field of hormone receptors, and Dr Amandine Gillet (Harvard University, USA), an expert in evolutionary biology. His lab exemplifies how fundamental structural biology can illuminate both human disease and the deep history of life, with real impact on public health and biomedical innovation.

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