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**THE MOLECULAR LANGUAGE OF SMELL:
READING ODORS THROUGH RECEPTORS.**

7.JULY 2026 – 11 AM – LECTURE HALL


This morning, you may have enjoyed a cup of coffee or tea and felt that its aroma had stimulated your sense of smell. The volatile molecules in your favourite beverage are recognized by the olfactory receptors (ORs) expressed in your olfactory epithelium. But among your 400 ORs, which ones were activated by these molecules?

To answer this question, and more generally to determine the molecular recognition spectrum of ORs, we design the Molecule to Olfactory Receptor M2OR database (<https://m2or.chemsensim.fr/>), which brings together 75,050 bioassay experiments for 51,683 distinct OR-molecule pairs.[1] We further combine protein language[2] with graph neural networks to predict OR activation, and propose a tailored architecture incorporating inductive biases from the protein-molecule interaction.[3] This model outperforms state-of-the-art drug-target interaction prediction models as well as standard GNN baselines. Notably, our predictions are in agreement with combinatorial coding theory in olfaction.

References

- [1] Lalis, M., Hladiš, M., Khalil, S. A., Briand, L., Fiorucci, S., & Topin, J, 2024. M2OR: a database of olfactory receptor–odorant pairs for understanding the molecular mechanisms of olfaction. *Nucleic Acids Research*, 52(D1), D1370-D1379.
- [2] Elnaggar, A., Heinzinger, M., Dallago, C., Rehawi, G., Wang, Y., Jones, L., ... & Rost, B. (2021). Prottrans: Toward understanding the language of life through self-supervised learning. *IEEE transactions on pattern analysis and machine intelligence* 2022, 44(10), 7112-7127.
- [3] Hladiš, M., Lalis, M., Fiorucci, S., & Topin, J. Matching receptor to odorant with protein language and graph neural networks 2023. In *The Eleventh International Conference on Learning Representations*.

Invited by : Lucie Sancey, Emmanuel Brun

 Twitter : IAB_Officiel
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Allée des Alpes, 38700 La Tronche (tram line B, stop : Grand Sablon)
The seminar is followed by discussions and exchanges with the
speaker and a sandwich buffet is offered