



# COST

European Network on New Sensing Technologies for Air Pollution Control  
and Environmental Sustainability - *EuNetAir*

COST Action TD1105

**WGs and MC Meeting at Istanbul, 2-5 December 2014**

Action Start date: 01/07/2012 - Action End date: 30/06/2016

Year 3: 1 July 2014 - 30 June 2015 (*Ongoing Action*)



**Marcel BOUVET**

Sub-WG 1.3 leader, MC member

University of Burgundy - Dijon / France

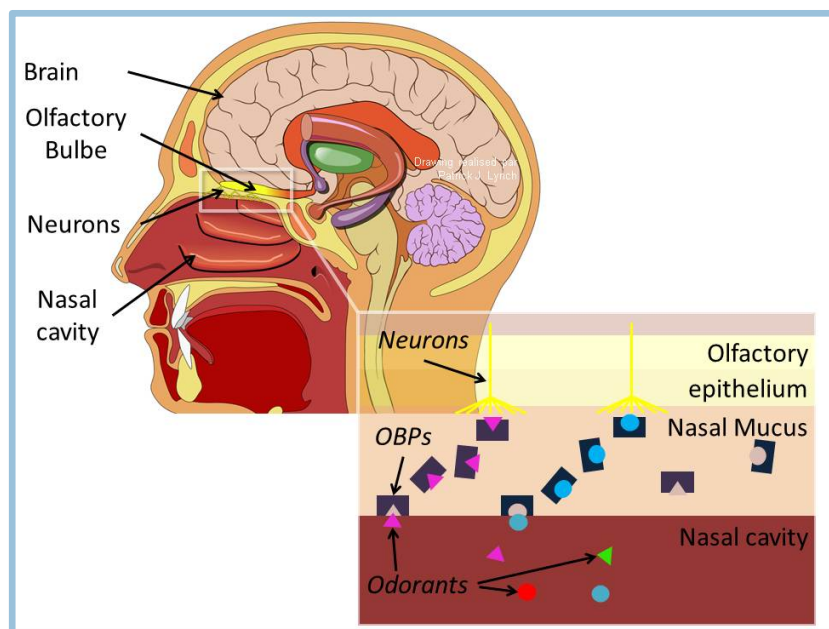
E. Barou, R. Meunier-Prest, L. Briand

 **cost**  
EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY



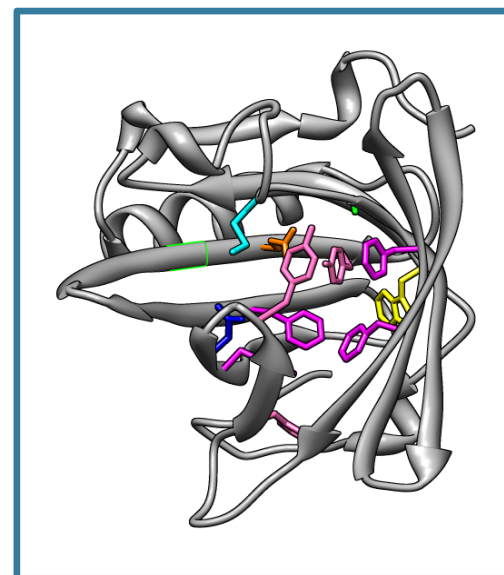
# Electrochemical detection of odorant molecules based on proteins

## Odorant Binding Proteins (OBPs)



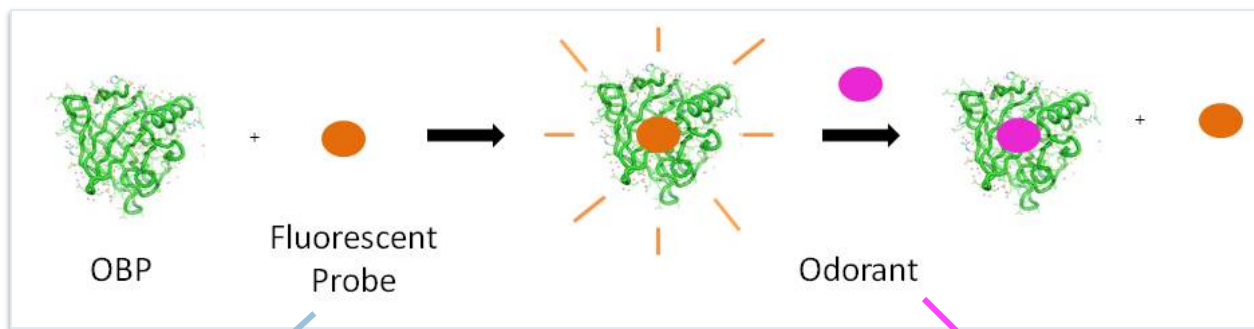
- Soluble proteins with an hydrophobic cavity
- Ensure the transport of odorant molecules towards the olfactory receptors

- We used a protein from rat: rOBP3

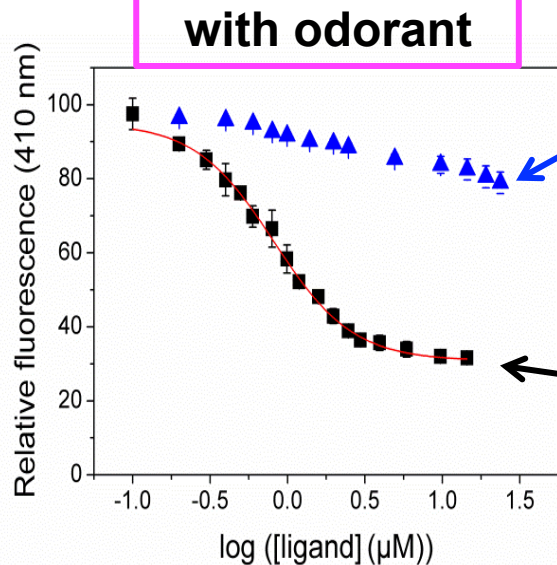
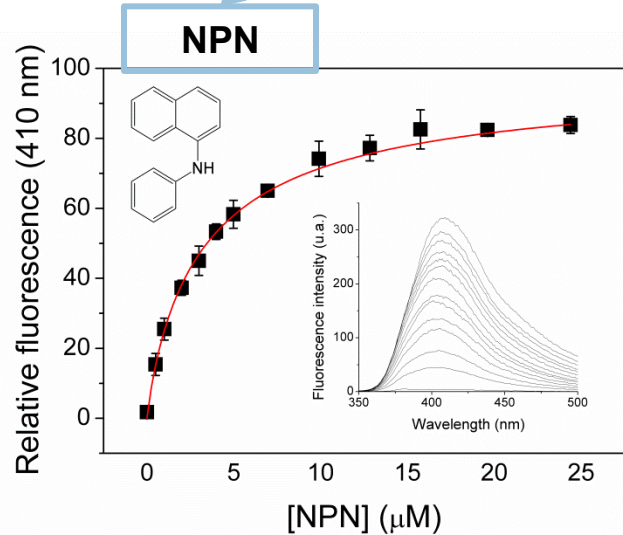


Lobel et al., Chem. Senses 2002, 27, 39

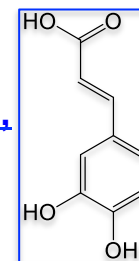
# Competitive detection by fluorescence:



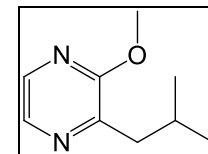
L. Briand et al, Biochemistry, 41 (2002) 7241-7252.



**Low affinity for AC, Caffeic acid**



**Strong affinity for IBMP  
2-isobutyl-3-méthoxypyrazine**



$$Kd_{rOBP3/IBMP} = 0.4 \pm 0.2 \mu\text{M}$$

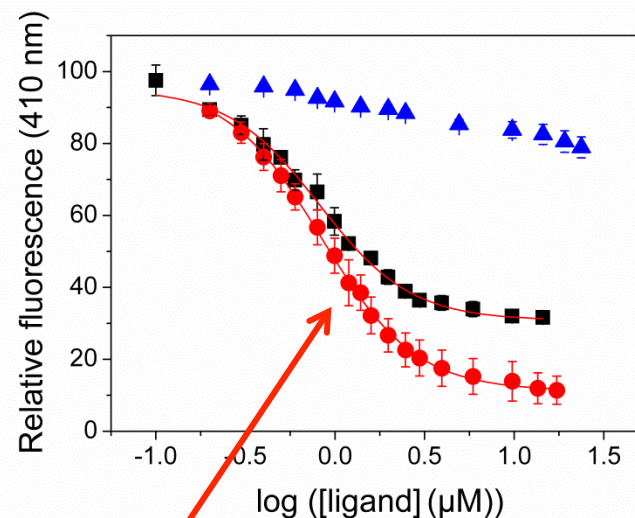
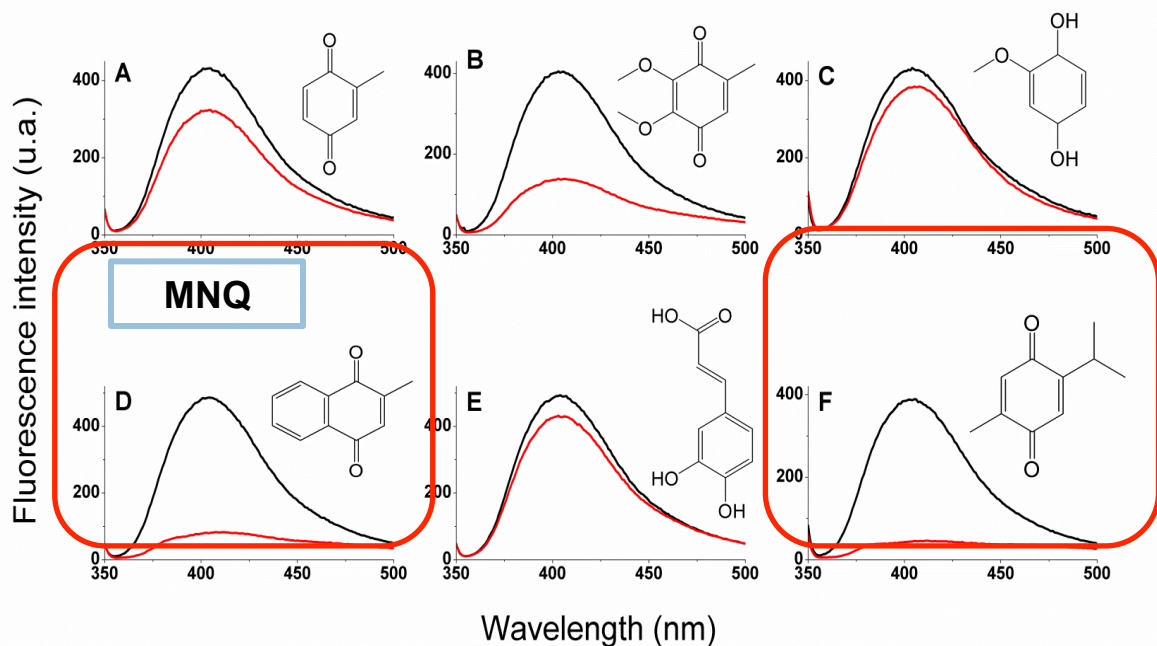
- Selection of an electrochemical probe:

**Quinones = small and hydrophobic redox active molecules**

Laviron, E. J. Electroanal. Chem. 1983, 146, 15-36; Meunier-Prest, R., Laviron, E. J. Electroanal. Chem. 1992, 328, 33-46  
 Lemmer, M. Bouvet, R. Meunier-Prest, Phys. Chem. Chem. Phys., 13, 13327-13332, 2011.  
 C. Liehn, M. Bouvet, R. Meunier-Prest, ChemElectroChem, 2014, DOI: 10.1002/celec.201402191R2



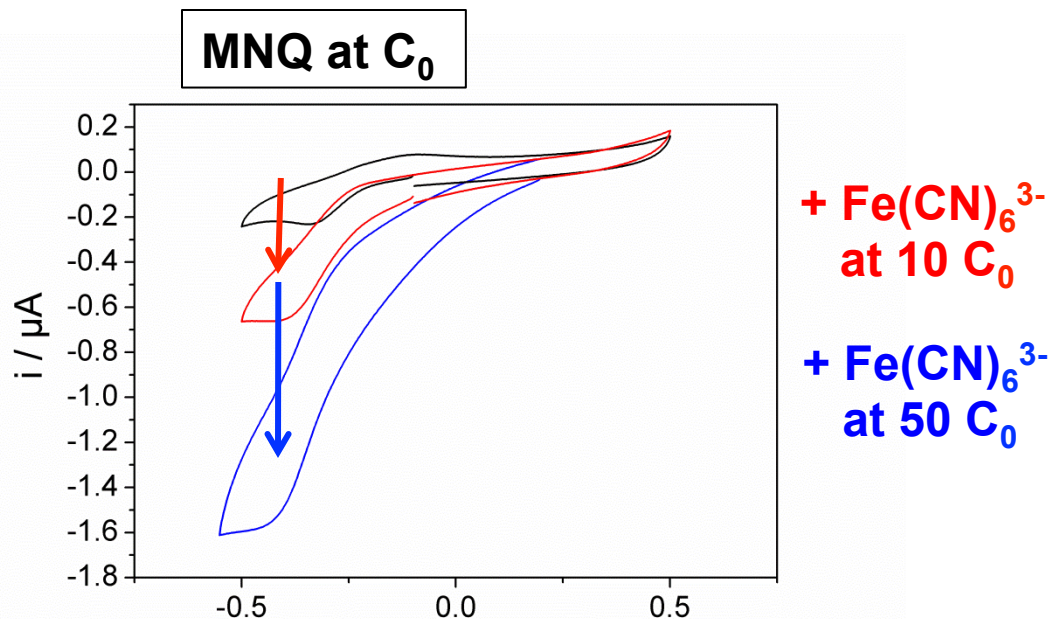
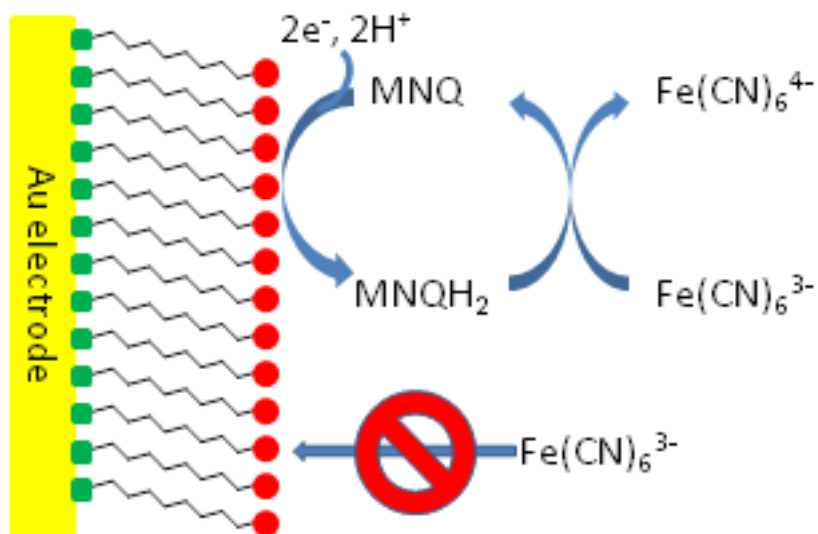
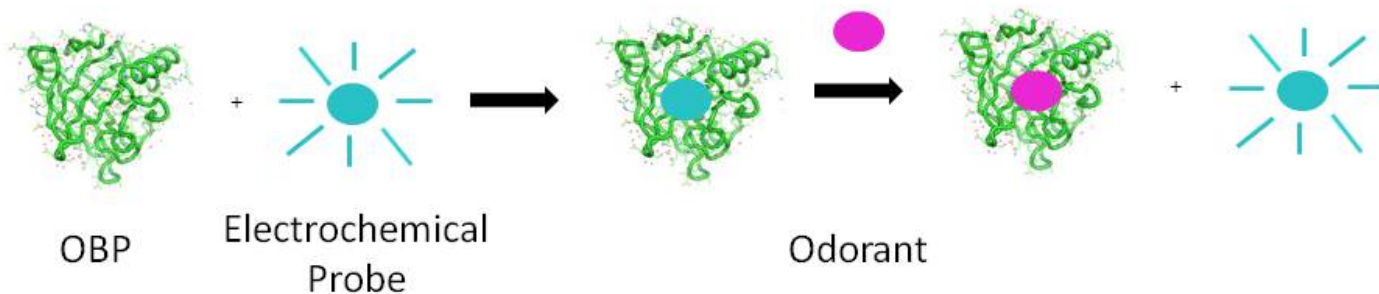
**Test de compétition Quinone/NPN par fluorescence**



**Strong affinity of MNQ**

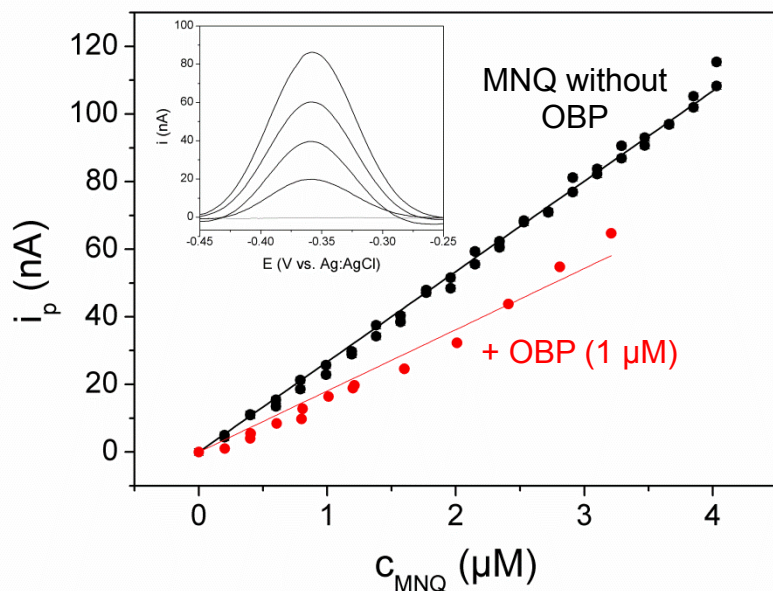
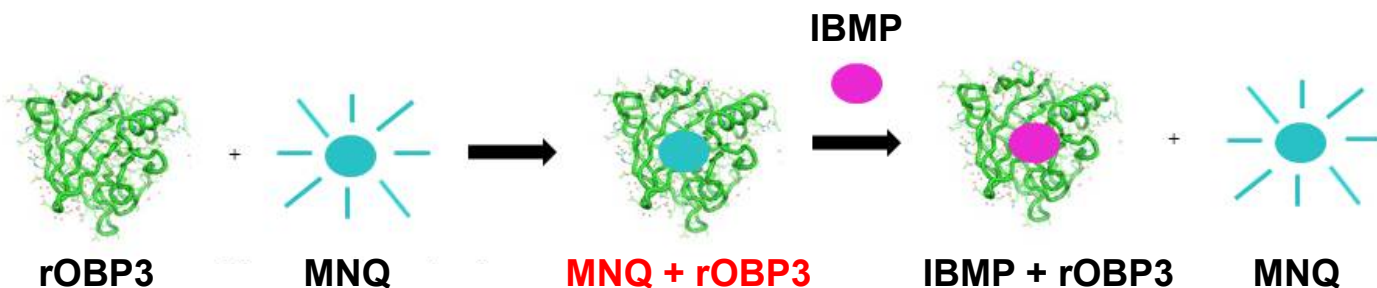
**$K_{d_{rOBP3/IBMP}} = 0.5 \pm 0.2 \mu\text{M}$**

- The electroanalytical method:

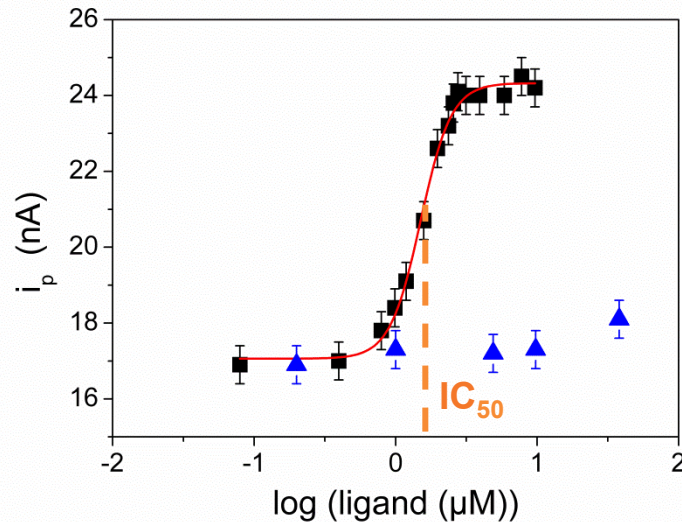


E. Barou, M. Sigoillot, M. Bouvet, L. Briand, R. Meunier-Prest "Electrochemical detection of the 2-isobutyl-3-methoxypyrazine model odorant based on odorant-binding proteins: The proof of concept", *Bioelectrochemistry*, 101, 28-34, 2015

- Determination of the OBP-odorant affinity:



at  $C_{MNQ} = 1 \mu M$



For IBMP:

$$Kd_{rOBP3/IBMP} = IC_{50} / (1 + [MNQ] / Kd_{rOBP3/MNQ})$$

$$Kd_{rOBP3/IBMP} = 0.5 \pm 0.2 \mu M$$

## • Acknowledgments:



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