Innover avec les enzymes

Adebiotech - Paris 27-28 octobre 2014

www.proteus.fr

- **Pharmaceuticals ;**
- **Cosmetics ;**
- **Home & Personal Care;**
- **Agro-industry ;**
- **Environment ;**
- **Energy ;**
- **Others (paper, textile, chemistry ...)**

Fields of Innovation

Consulting	• Desk-based feasibility studies and proposal of strategies
Screening	• Proteus enzymes portfolio • Micro-organisms library
Optimization	• Enzyme engineering (Mol. Biol.) • Improvement of enzyme manufacturing process – Formulation
Scale up	• Production of enzymes • Optimization of fermentation process • Management of CMOs
Industrialization (PCAS)	• Manufacturing using chemo-biocatalytic processes under GMP or non GMP standards

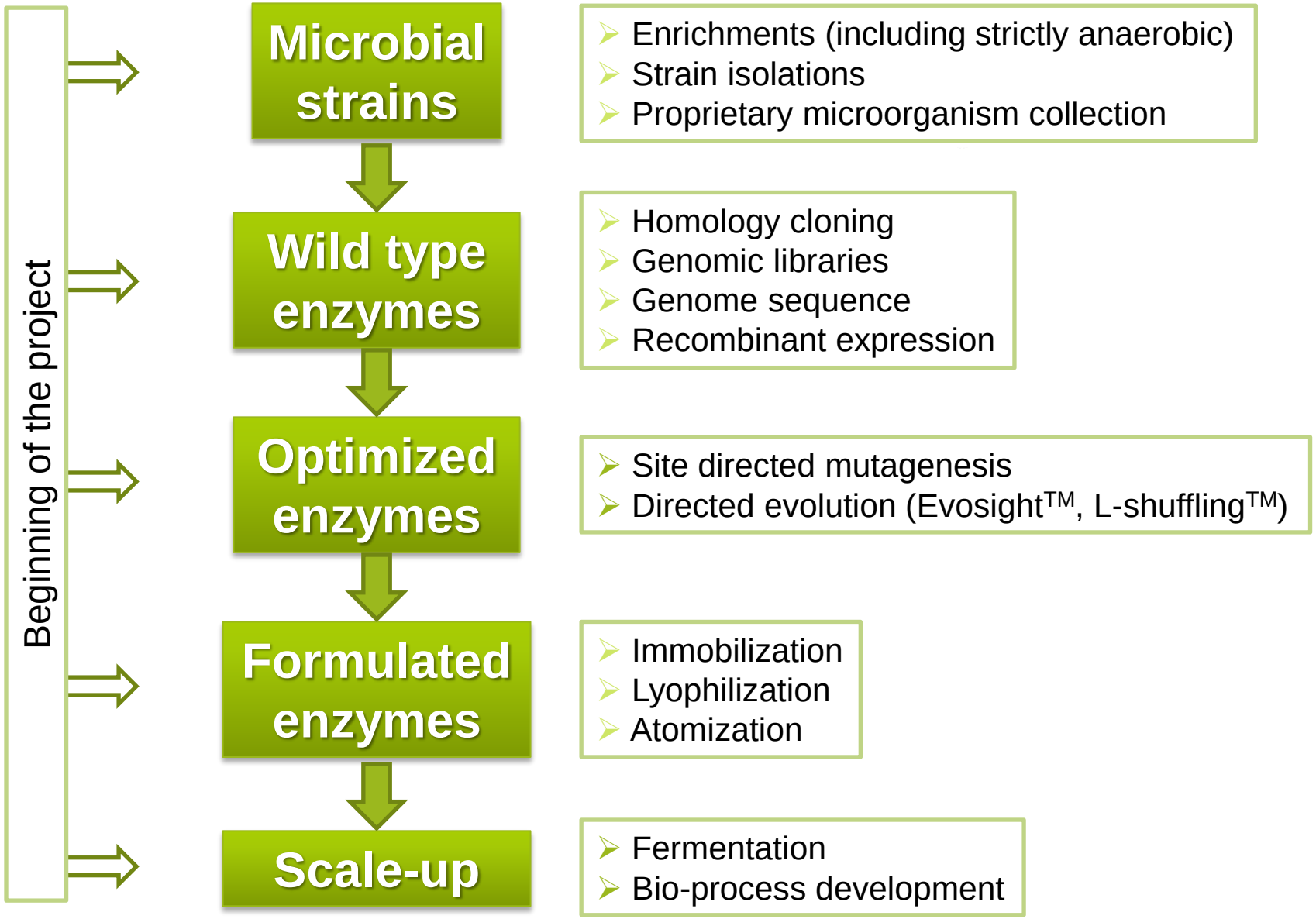
Multi-disciplinary Team

Biodiversity resources

proteus
pcas

Automatized platform

Commercial Production



Strategies for obtention of fine- tuned enzymes

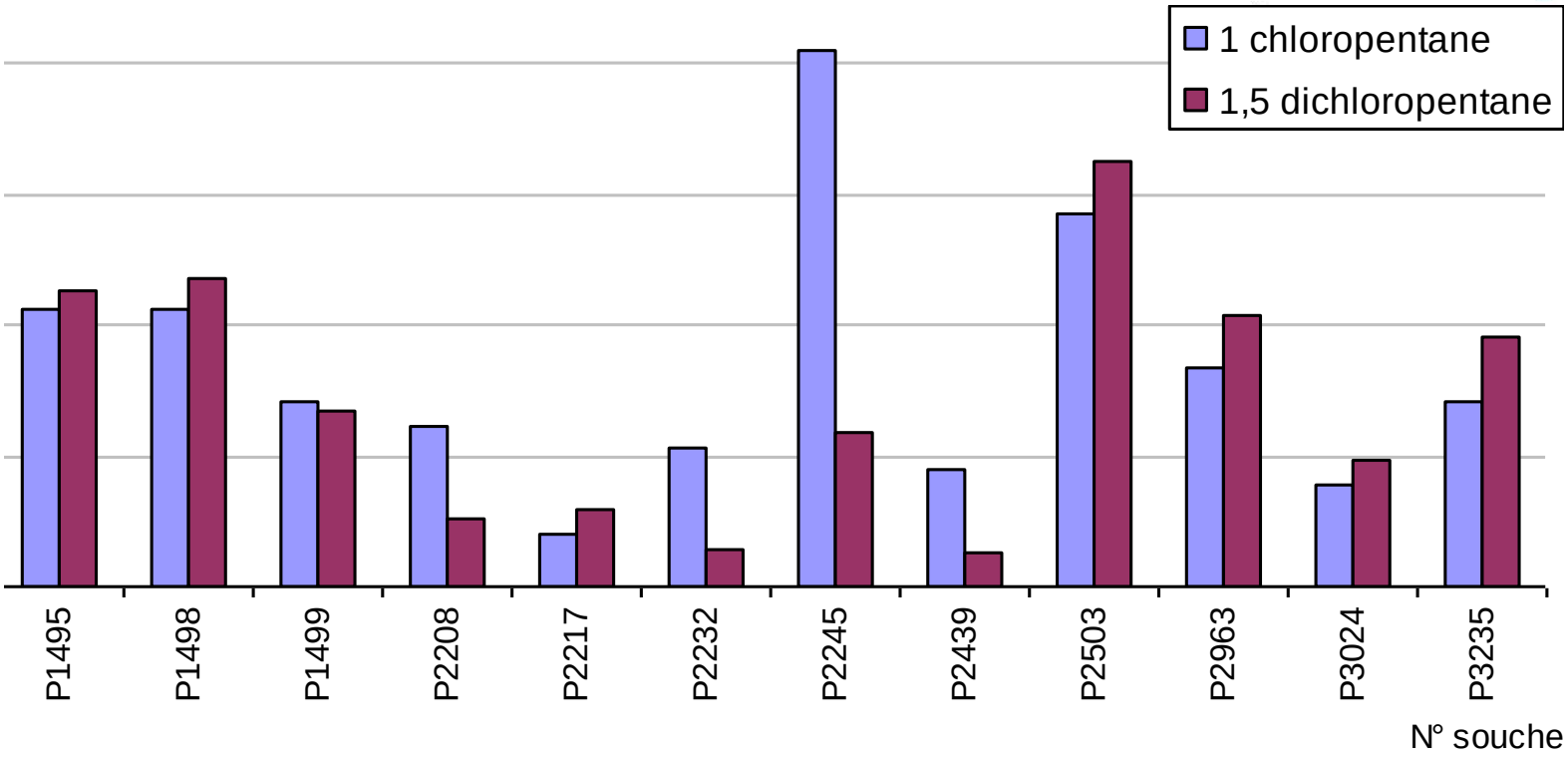
Examples : dehalogenases

Different strategies for different substrates

Carbon source : targeted substrate
Inoculum = suitable environmental samples (polluted with halogenated compounds)

substrate	Isolated strains
chloro-3-butyric acid	29
3-chloro-1, 2-propanediol	53
2-chlorobutyramide	43 (incl. 28 enantioselective for one or the other enantiomer)
bromo-2-hexanoic acid	14

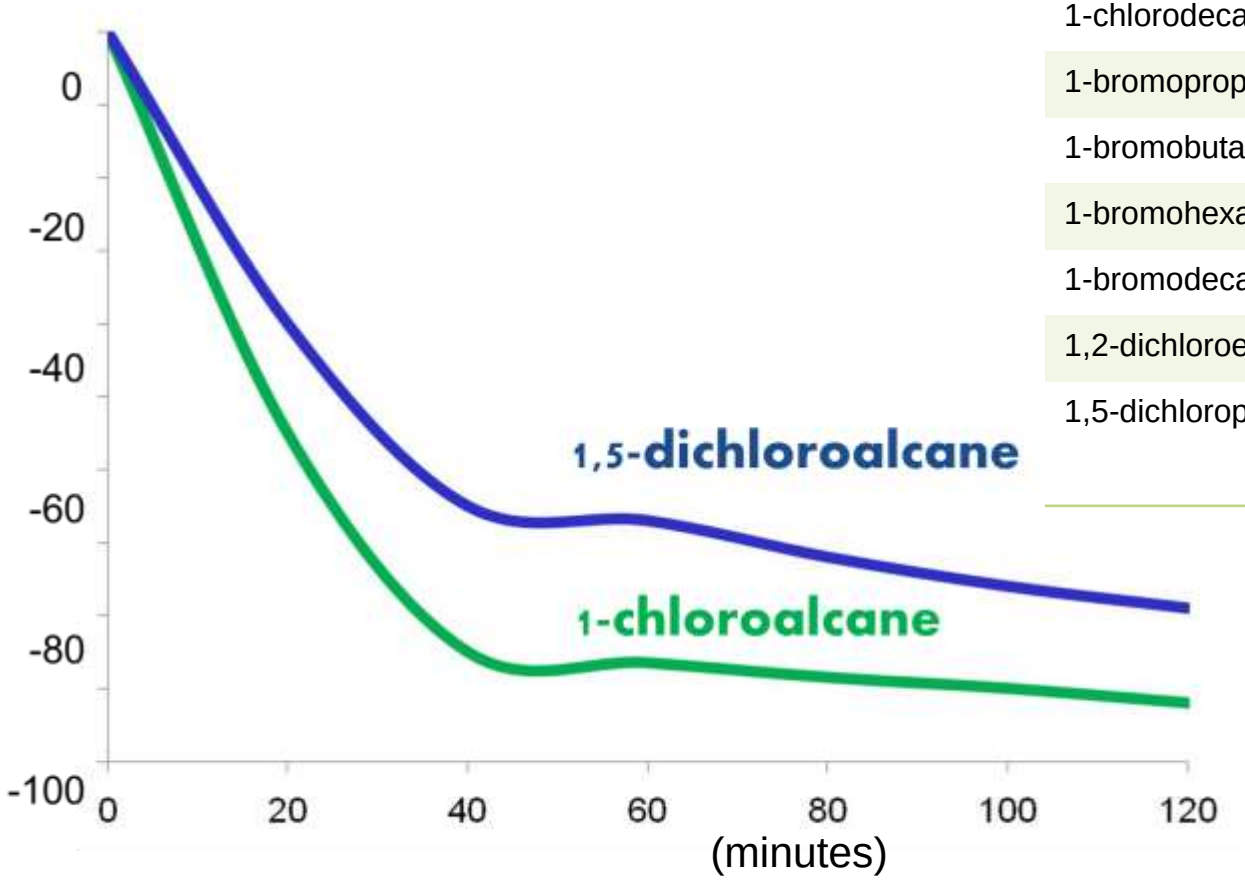
Enrichments and isolations



Screening of the collection of microorganisms

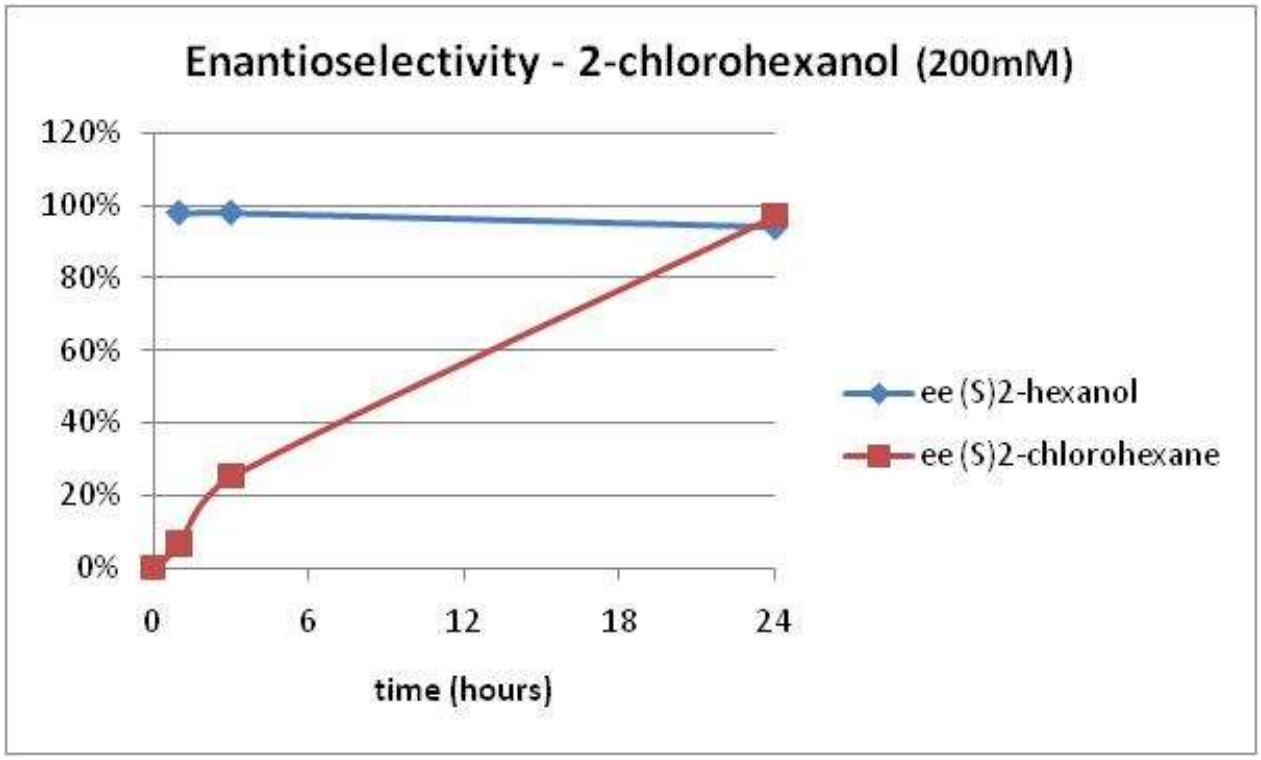
1800 strains screened

Substrate	Incubation time	% conversion
1-chloropentane	19h	100%
1-chlorodecane	19h	35%
1-bromopropane	4h	100%
1-bromobutane	4h	100%
1-bromohexane	4h	98%
1-bromodecane	4h	97%
1,2-dichloroethane	48h	29%
1,5-dichloropentane	19h	100%



Degradation of Chlorinated Alkanes

- Active with a large range of substrates
- Preference for brominated over chlorinated substrates
- Active on dichlorinated substrates



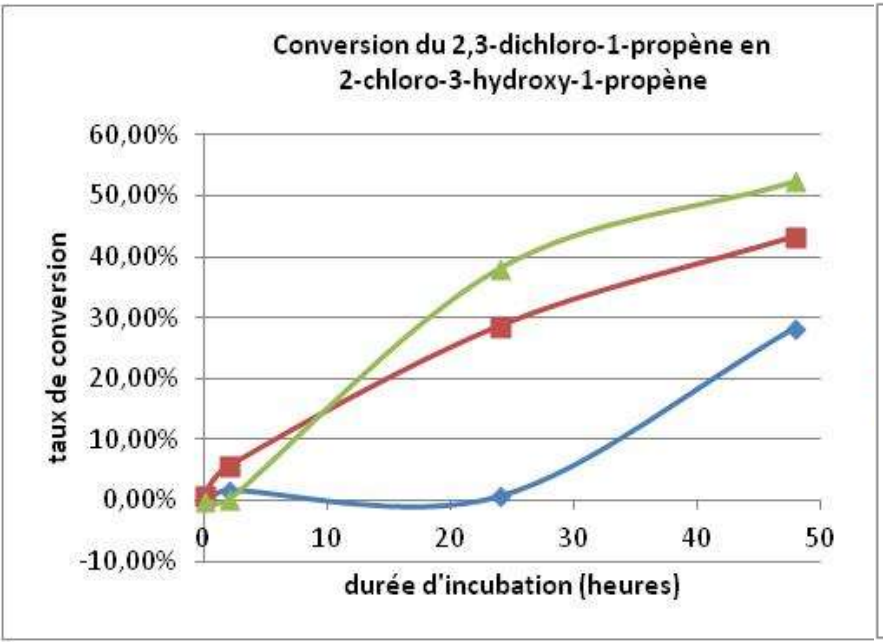
Enantioselectivity for Chlorinated Alcohols

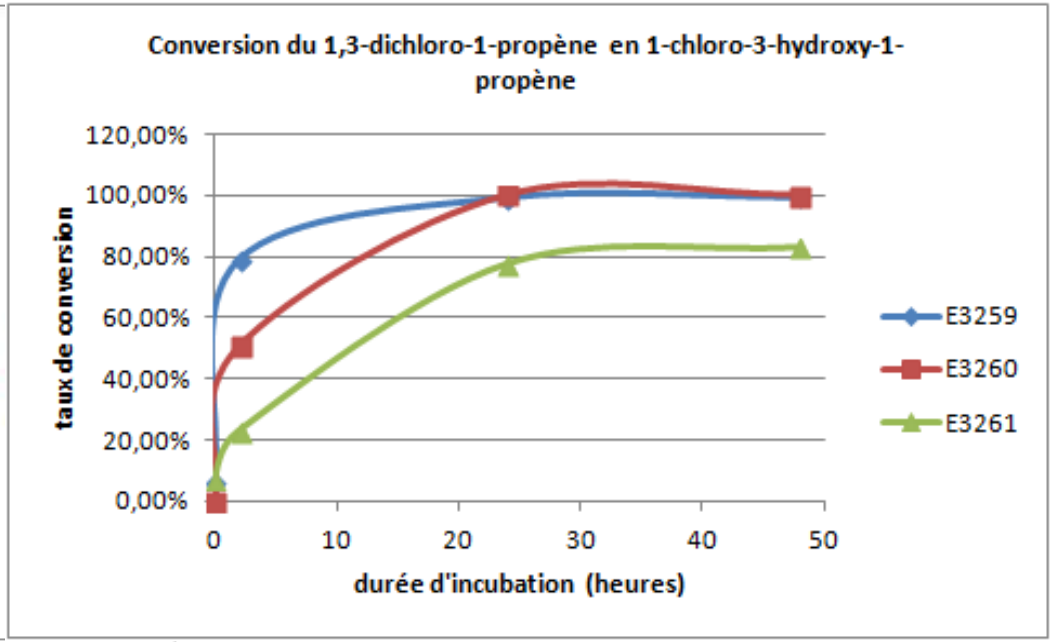
- Subterminal chlorinated substrates
- production of enantiomerically pure alcohols
- Less relevant for bioremediation
- Application in green chemistry is very promising

50mM substrate

biphasic (buffer / MTBE)

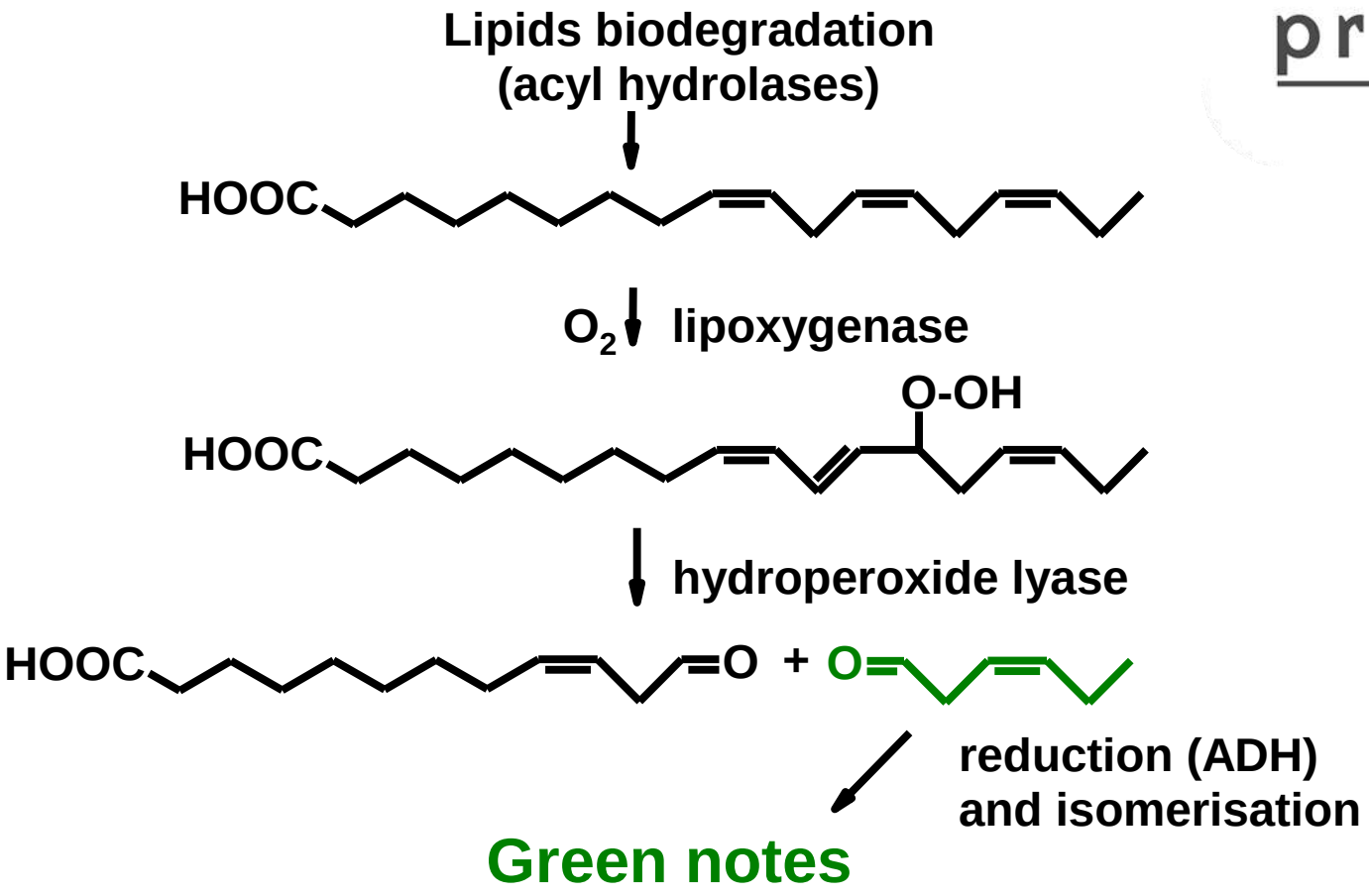
temperature 30°C





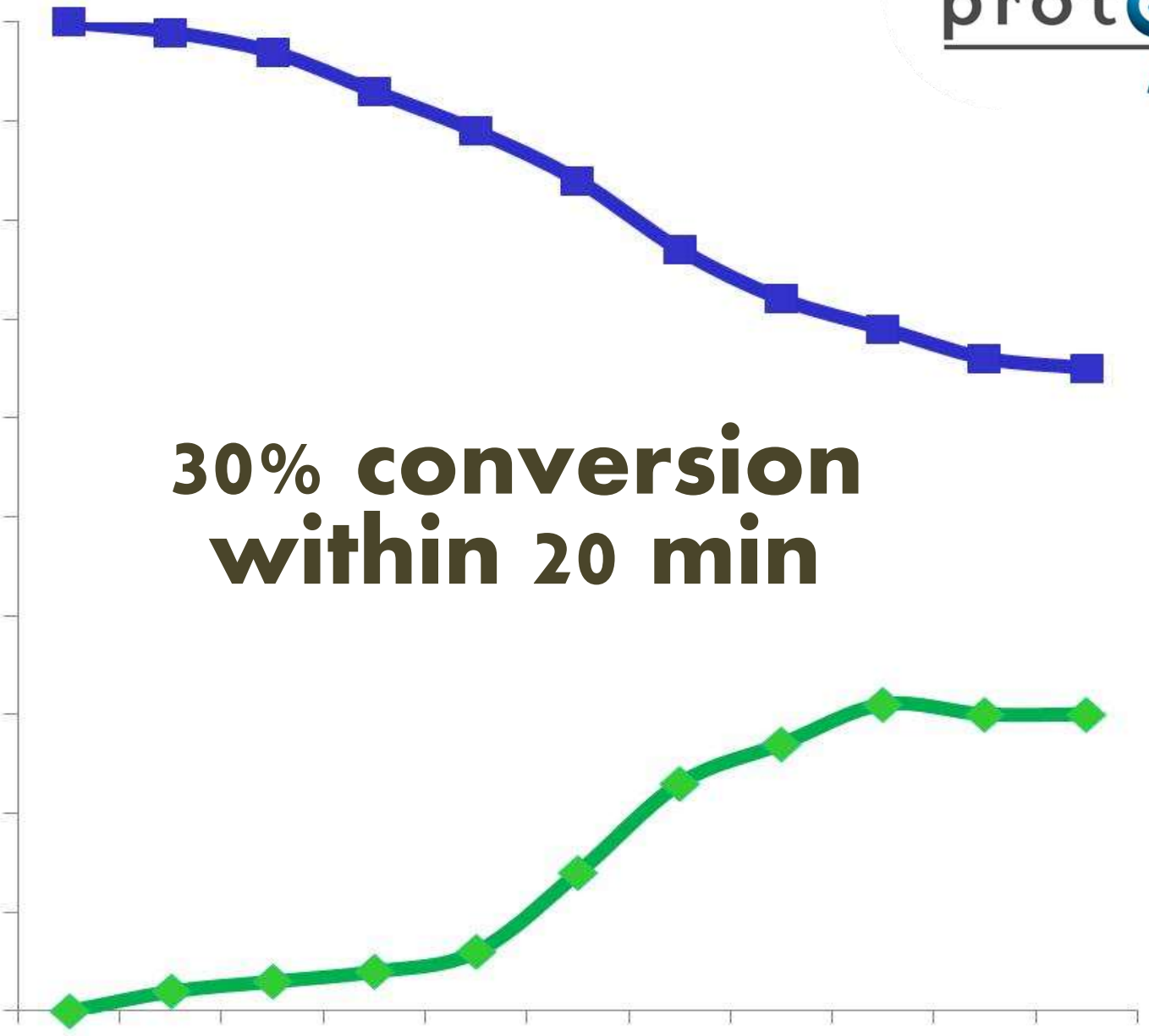
Screening of the enzymatic toolbox

Example : Directed Evolution

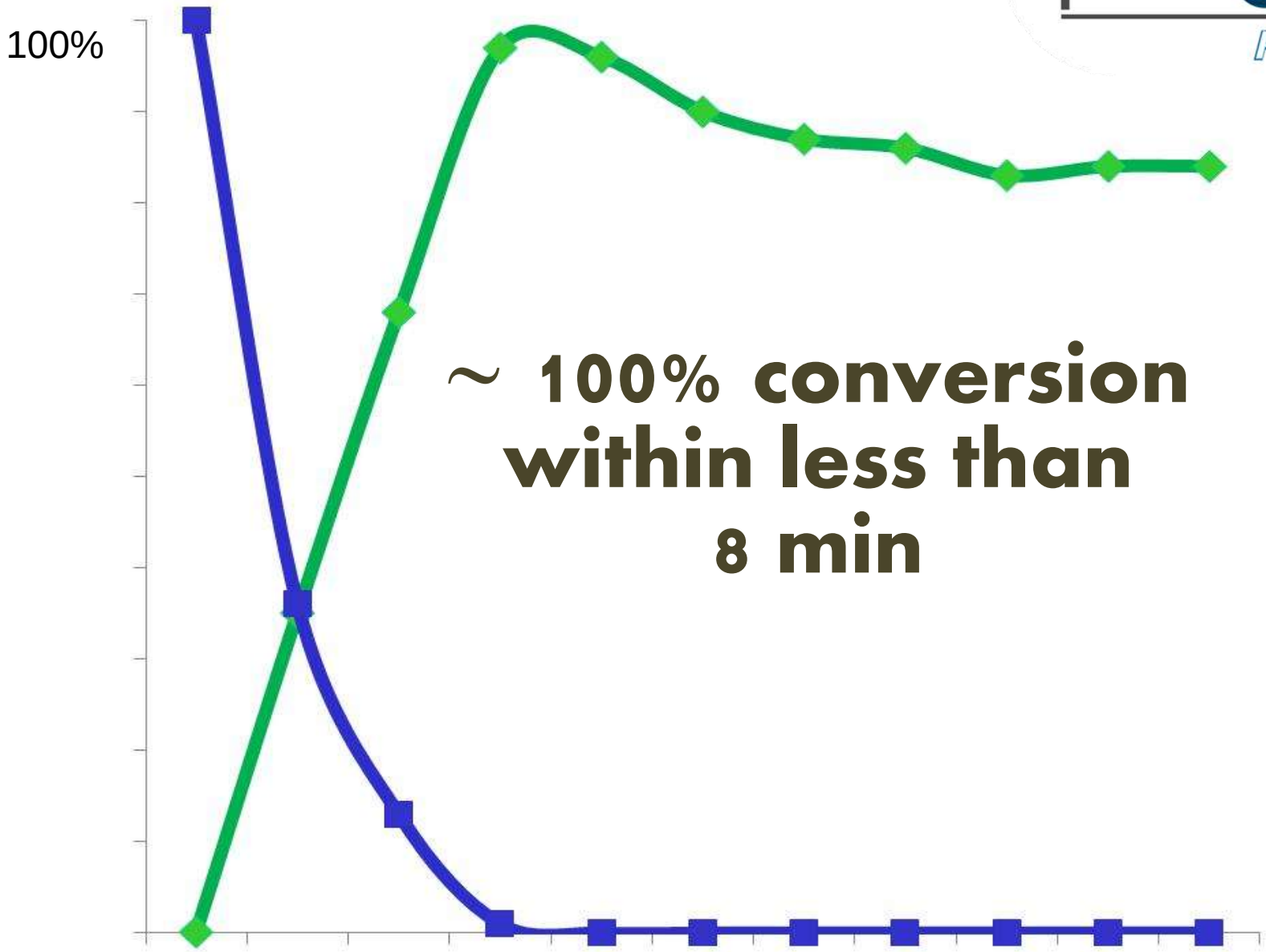


Directed Evolution

Grechkin *et al*. (2006) *Biochim. Biophys. Acta*, *1761*, 1419
Delcarte *et al* (2000) *Biotechnol. Agron. Soc. Environ*, **4** (3), 157–167



A collaboration with Firmenich



A collaboration with Firmenich

Green Route to Green Notes

Fredi Brühlmann, Bojan Bosijokovica, Christophe Ullmann, Pascal Auffray, Laurent Fourage, Denis Wahler.

Journal of Biotechnology **163 (2013) 339– 345**

More About This Work

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