

# Lipids and Lipolytic Enzymes of the Microalga *Isochrysis galbana*

**L. Poisson, F. Hubert, C. Loiseau, L. Gauvry,  
G. Pencreac'h, J. Hérault & F. Ergan**

Adebiotech - LIPINOV

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# MMS and Microalgae



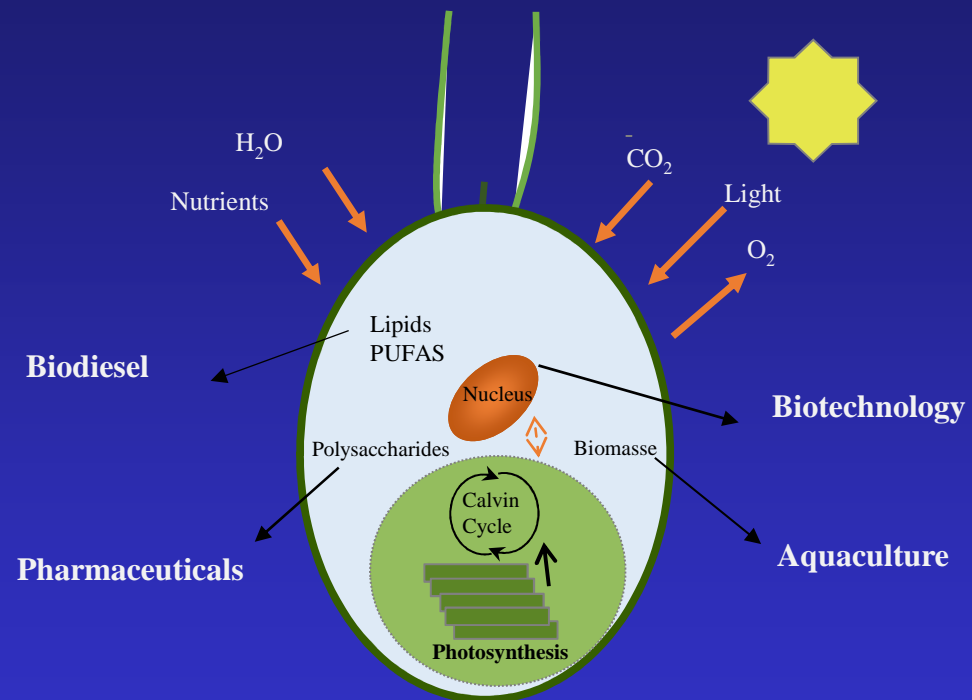
- Phycotoxins
- PUFAS
- Pigments
- Oyster greening...

(Mimouni et al. 2012)

# *I. galbana*: brief overview



**Empire :** Eukaryota  
**Kingdom :** Chromista  
**Phylum :** Haptophyta  
**Class :** Coccolithophyceae  
**Subclass :** Prymnesiophycidae  
**Order :** Isochrysidales  
**Family :** Isochrysidaceae



(adapted from Rosenberg et al., 2008)

# *I. galbana*: brief overview

Name	Strain code					Isolator
	CCAP	PLY	NCMA	UTEX	RCC	
<i>Isochrysis sp</i>	CCAP 927/12	PLY240			RCC3709	Butcher
<i>I. galbana</i> Parke	CCAP 927/1	PLY565	CCMP1323	LB 987	RCC1348	Parke
<i>Pseudoisochrysis paradoxa</i>	CCAP 949/1	PLY507	CCMP715	LB 1988	RCC1353	Ott
<i>I. affinis galbana</i> (T-iso)	CCAP 927/14	PLY506	CCMP 1324	LB 2307	RCC 1349	Haines

CCAP: Culture Collection of Algae and Protozoa (UK)

PLY: Plymouth (UK)

NCMA: National Center for Marine Algae and Microbiota (formerly CCMP) (USA)

UTEX: University of Texas (USA)

RCC Roscoff Culture Collection (France)

(Bendif et al. 2013)

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<i>Isochrysis galbana</i>	CCAP 949/1	PLY507	CCMP715	LB 1988	RCC1353	Ott
<i>Tisochrysis lutea</i>	CCAP 927/14	PLY506	CCMP 1324	LB 2307	RCC 1349	Haines

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# Production

CCAP 927/1 et 927/14

Culture 100L

• Greensea



Lipid extraction

Folch et al



Lipid  
separation



(Poisson & Ergon, 2001; Devos et al. 2005)

# Lipids analysis

Neutral lipids

Glycolipids

Phospholipids



← Sterols

← Triglycerides (TG)

← Free fatty acids (FFA)

← Monogalactosyldiacylglycerides (MGDG)

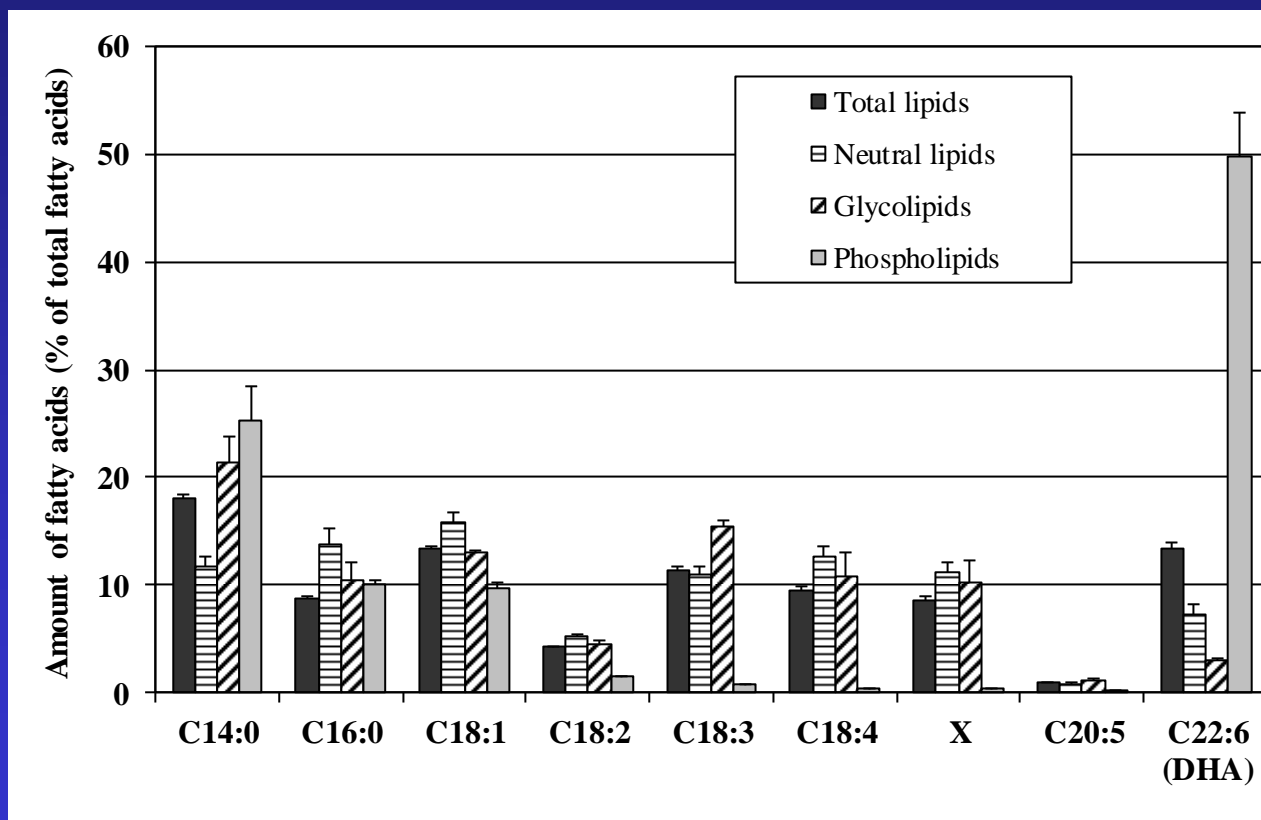
← Digalactosyldiacylglycerides (DGDG)

← Sulfoquinovosyldiacylglycerides (SQDG)

← Phosphatidylcholine (PC)

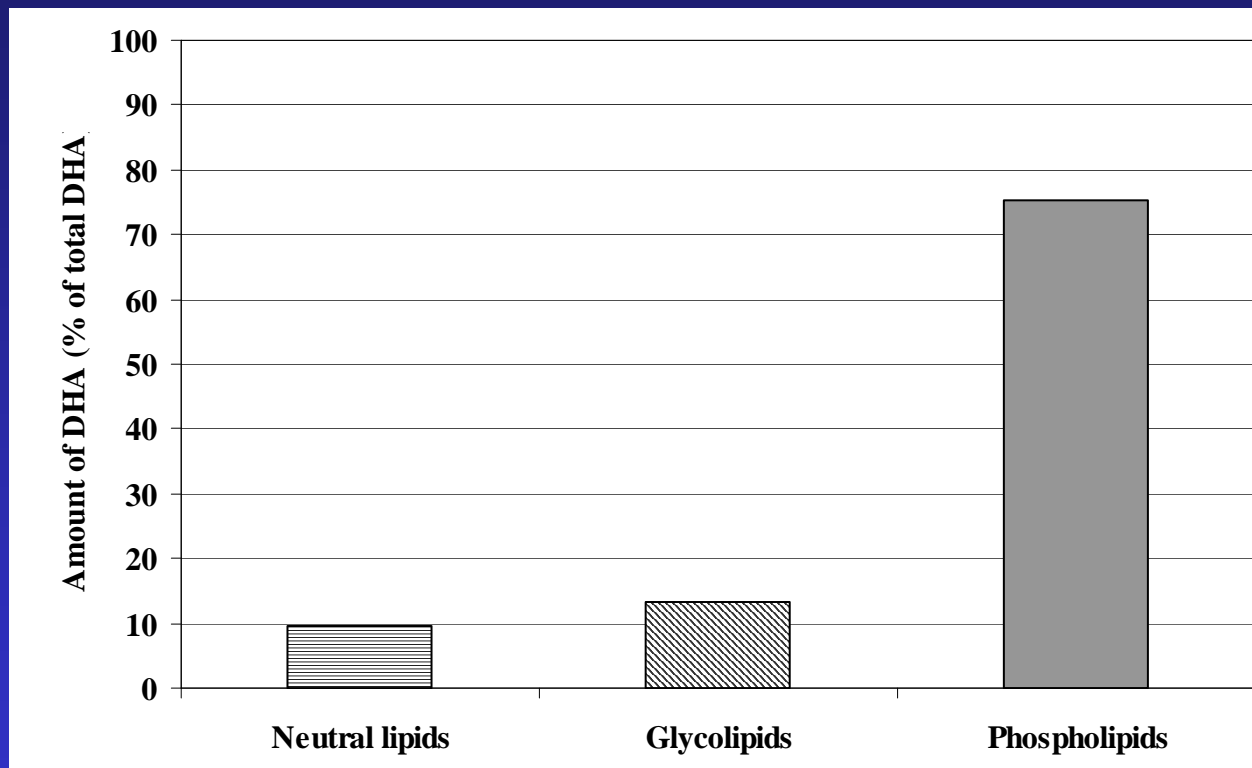
# Lipids analysis

CCAP 927/1





# Lipids analysis

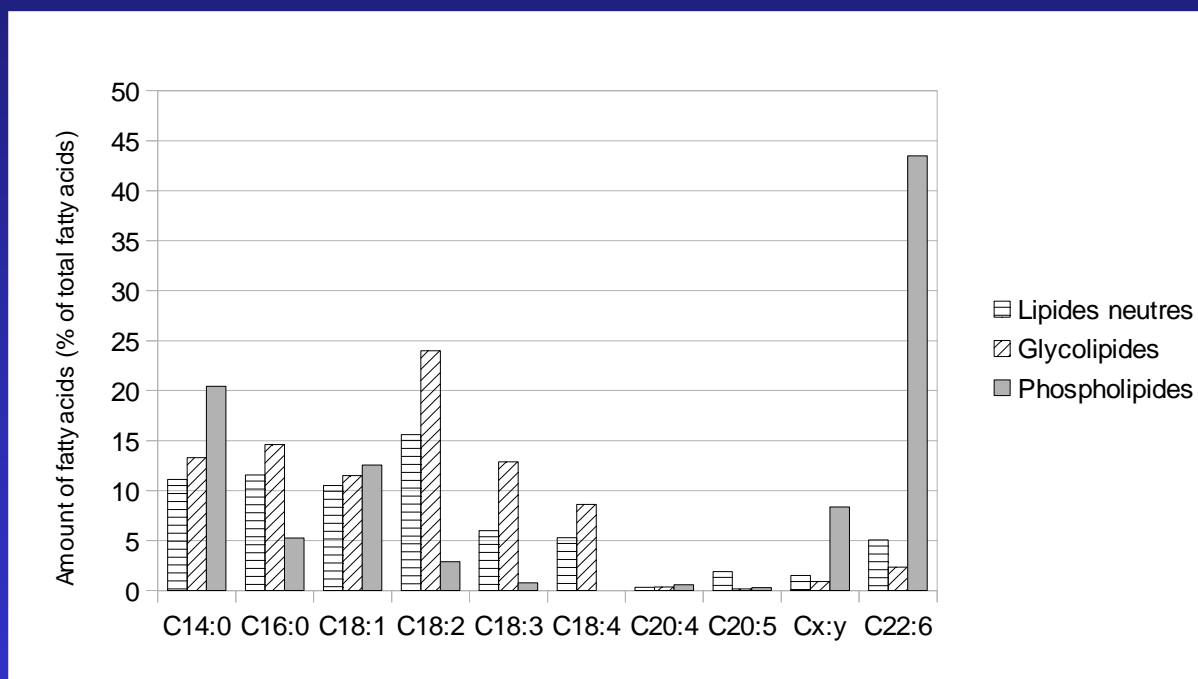


DHA is mainly located in phospholipids

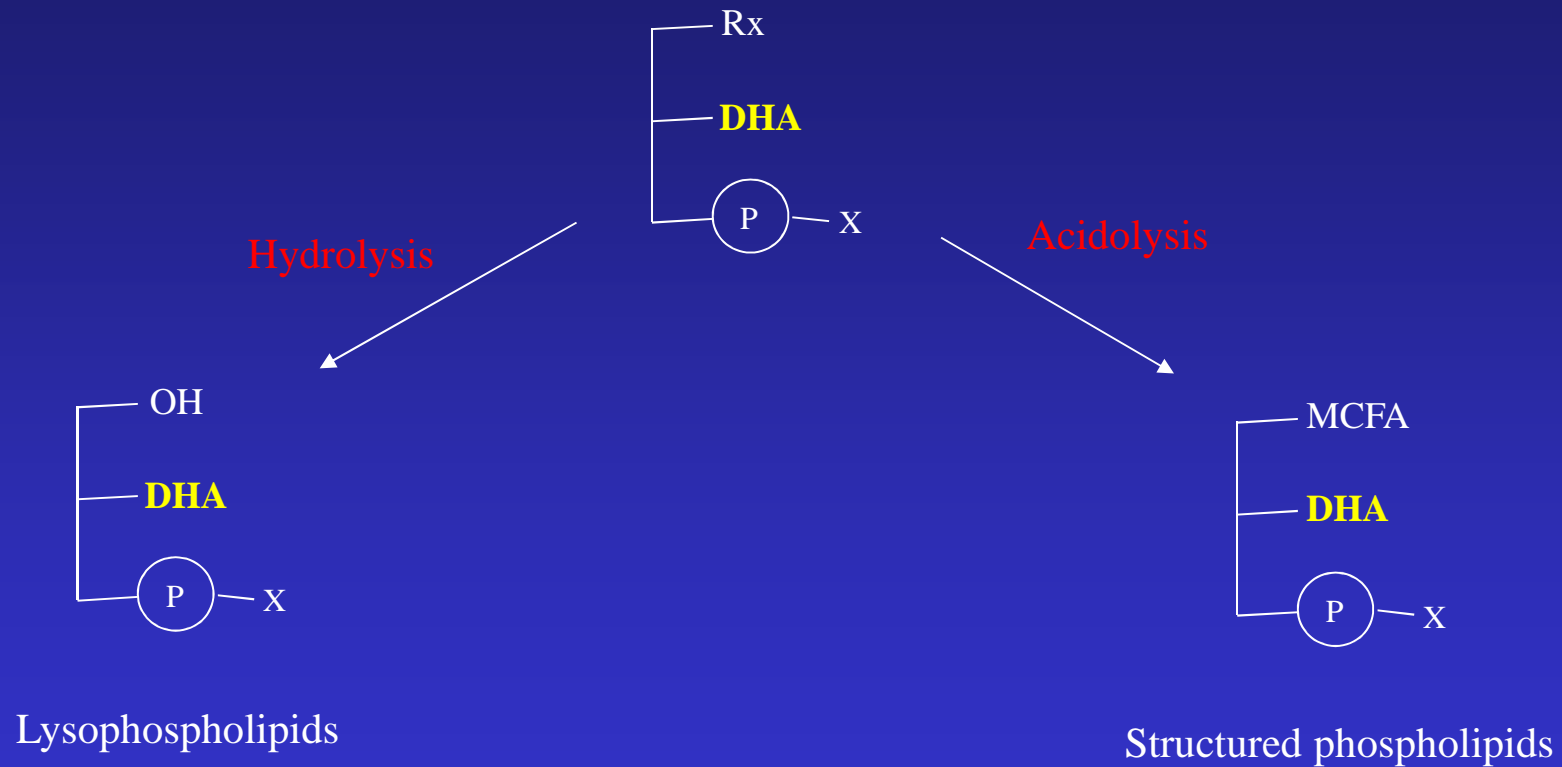
DHA is mainly located at sn-2 position

# Lipids analysis

CCAP 927/14



# Lipase-catalyzed phospholipid modification



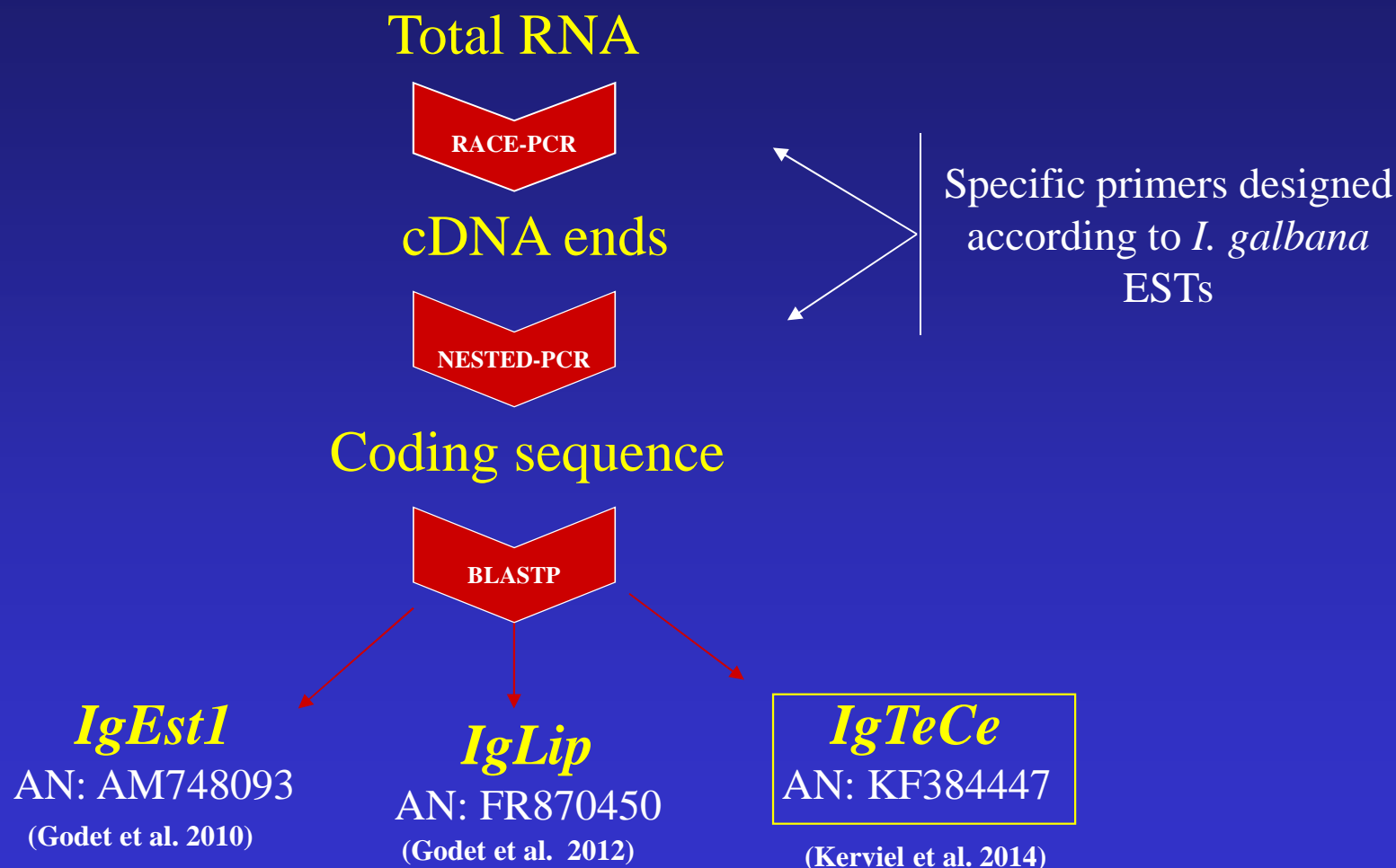
(Pencréac'h et al. 2013)

# Lipolytic enzymes from *Isochrysis galbana*

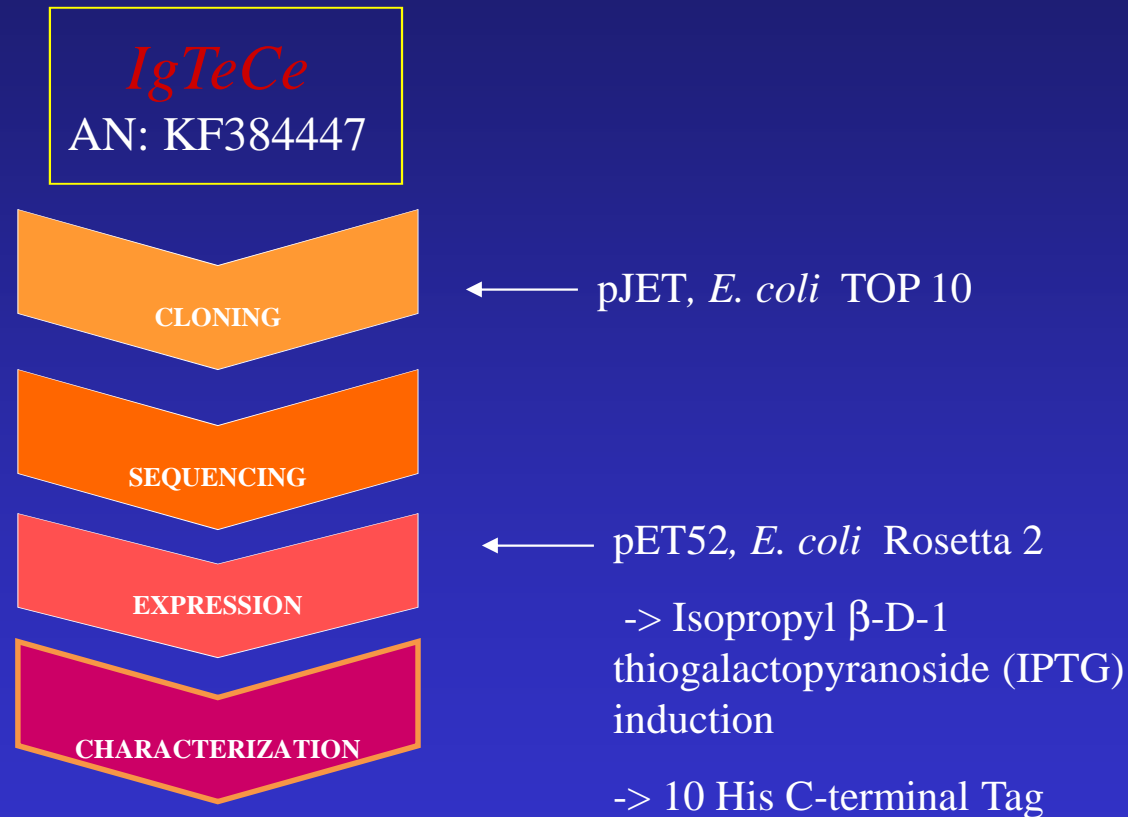
- Free fatty acids when biomass not treated with boiling water
- High proportion of LC-PUFAs

=> attractive enzyme selectivities

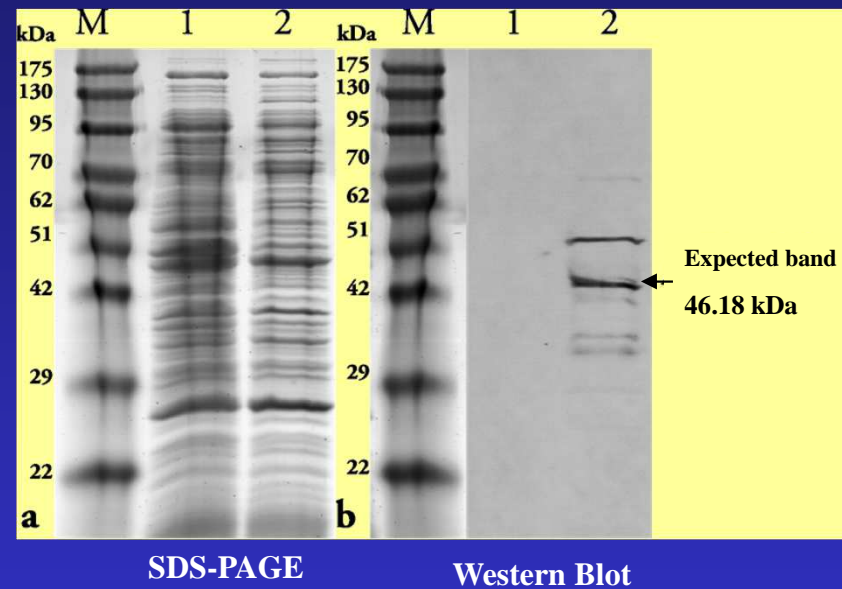
# Lipolytic enzymes from *Isochrysis galbana*



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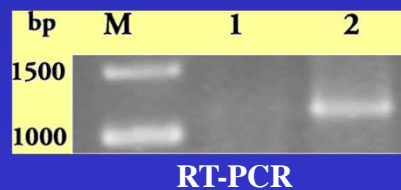


SDS-PAGE

Western Blot

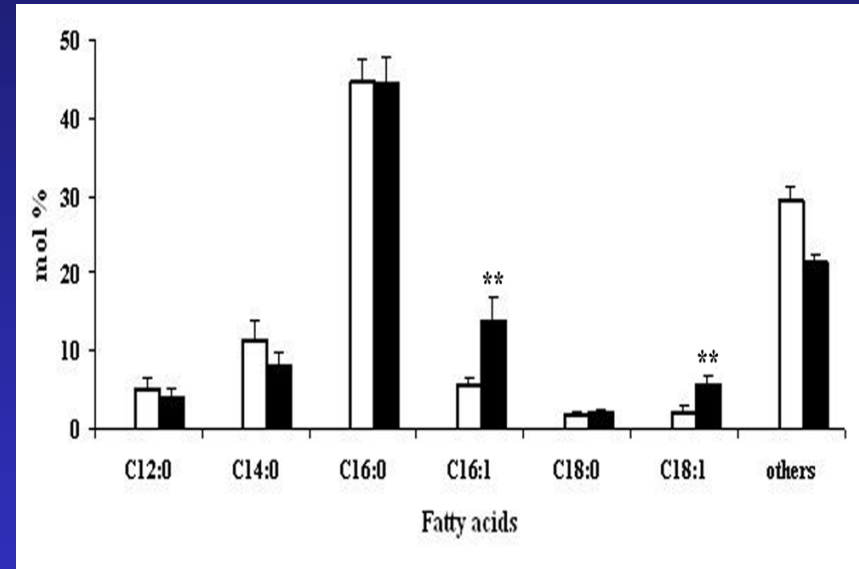
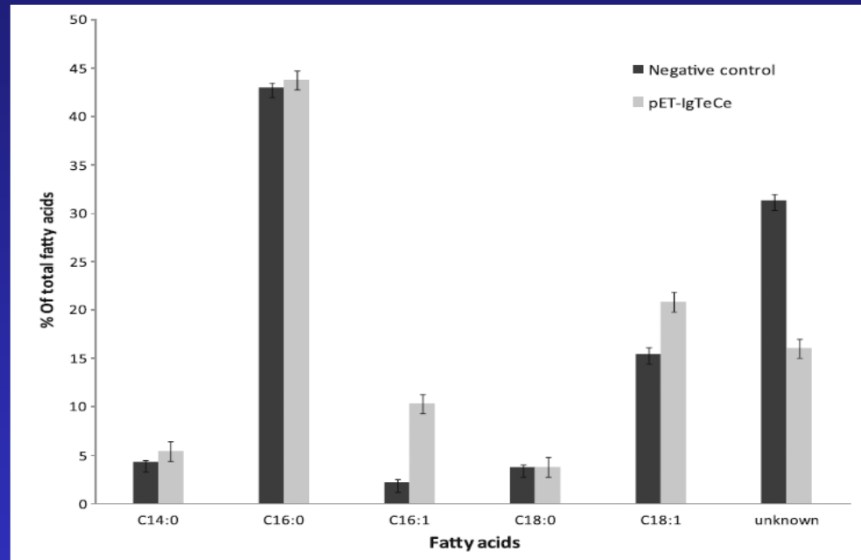
1: Negative control  
2: induced cells with 1mM IPTG

(Kerviel et al. 2014)



RT-PCR

# Lipolytic enzymes from *Isochrysis galbana*



(Chen et al. 2012)

*IgTeCe* should be identified as a thioesterase

=> *I. galbana* should further be explored



- Thank you for your attention -

