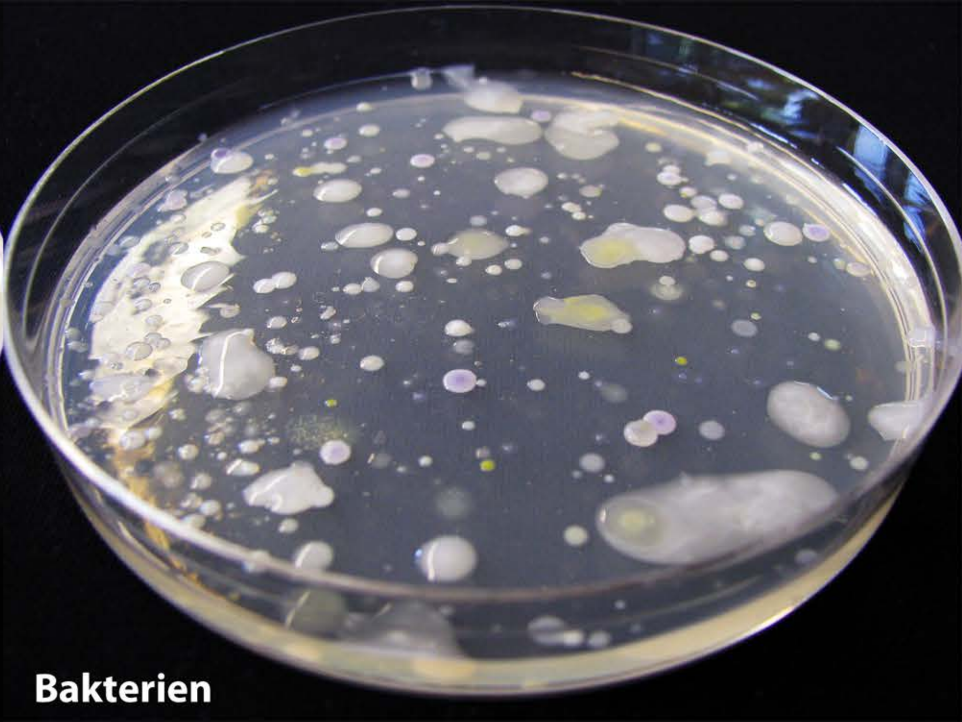
Phospho
Lipid
Fettsäure
Analysen

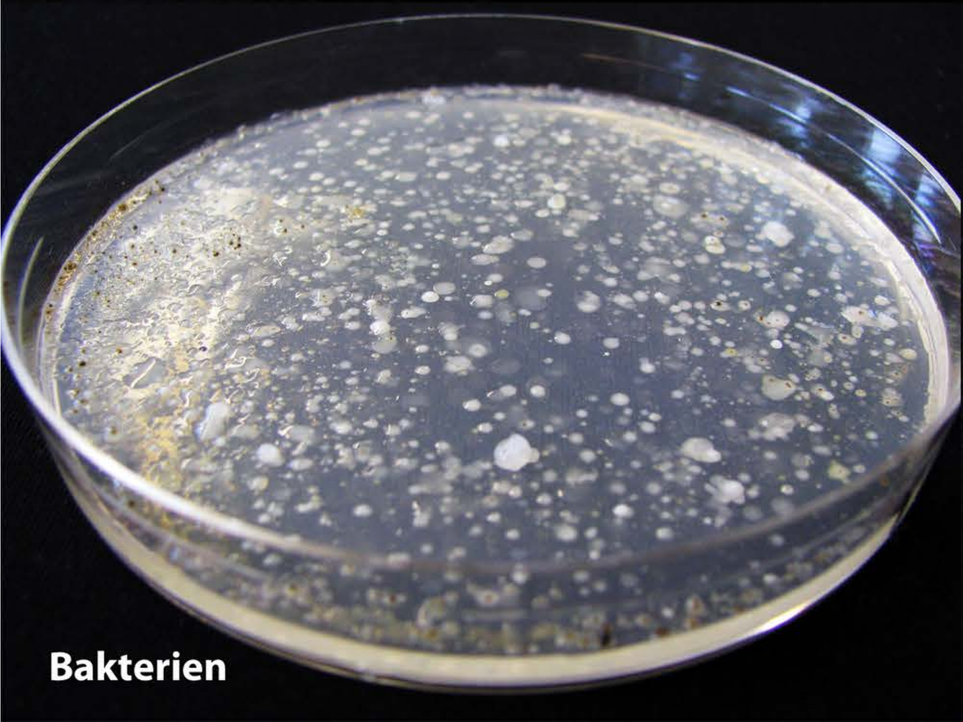
Quantifizierung von

Bakterien und Pilzen

Pilze



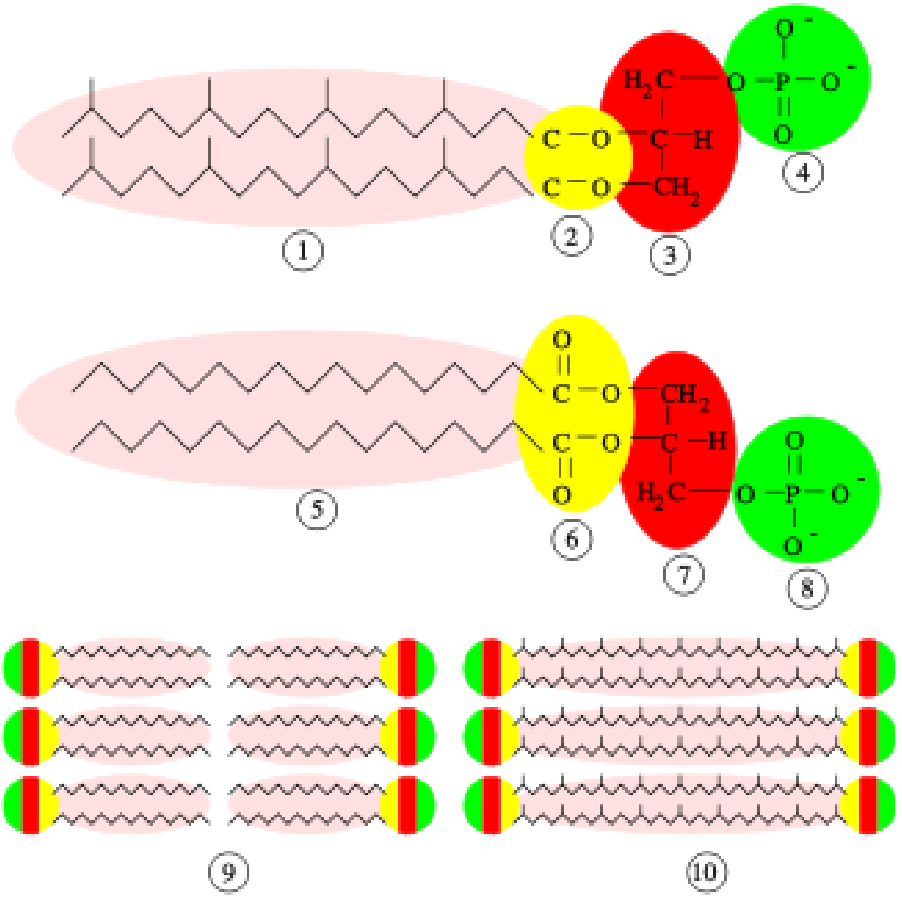
Bakterien



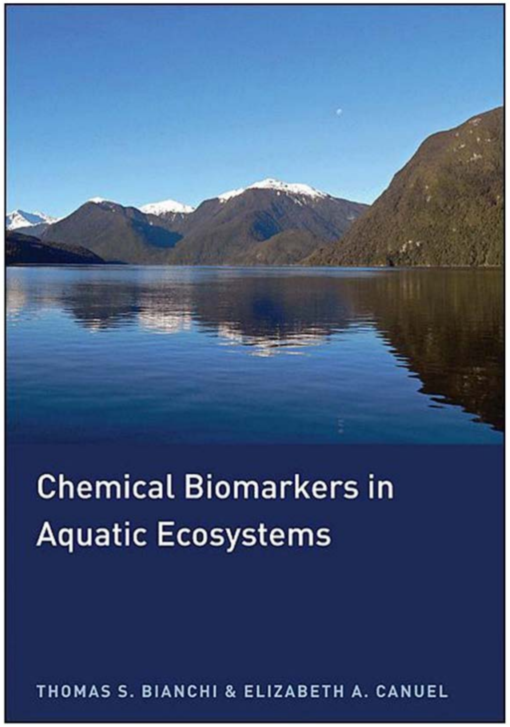
Bakterien

Bakterien

Membranen

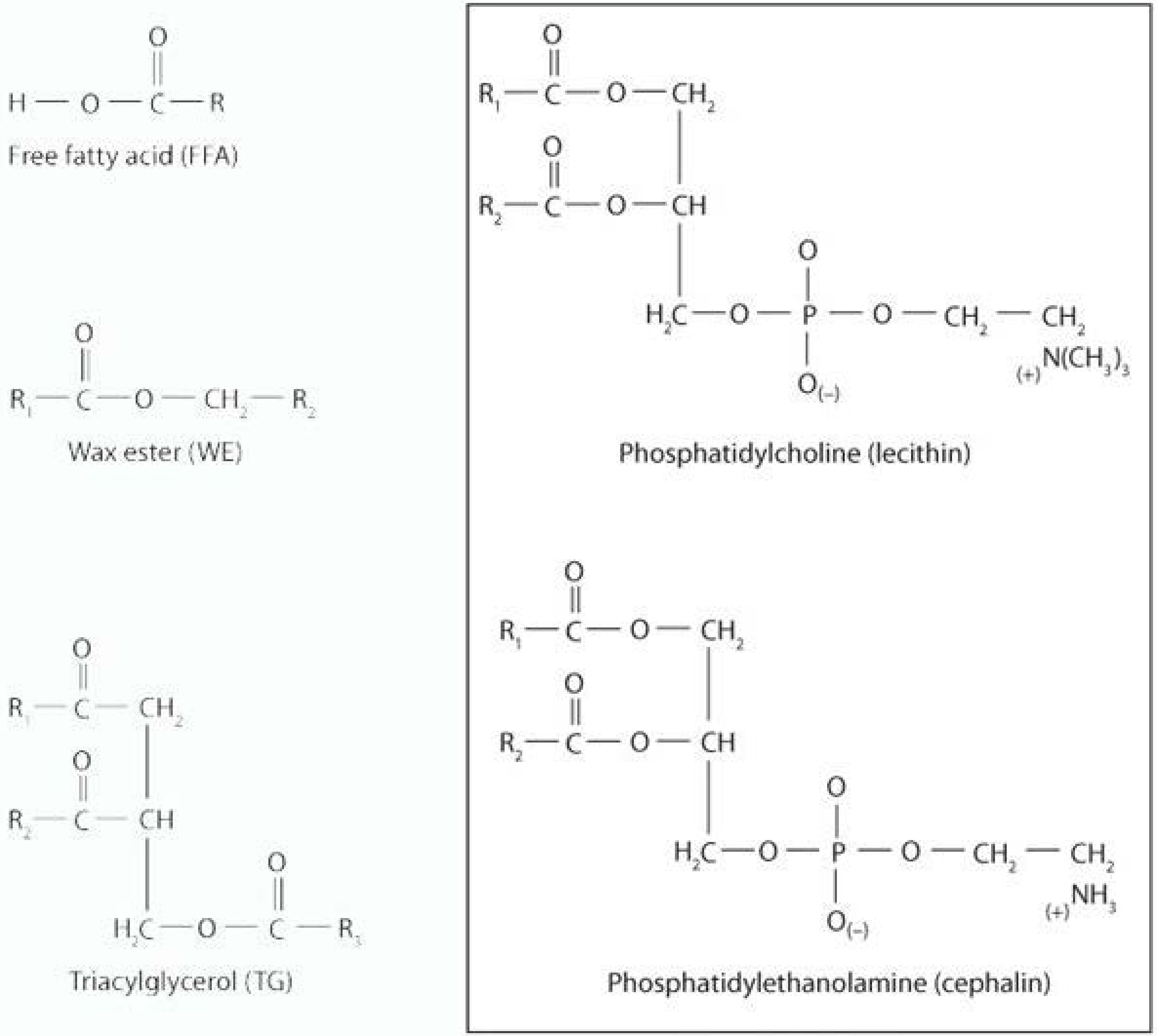


Oben: Phospholipid Archaeen, **1** Isopren Seitenkette, **2** Etherbindung, **3** L-glycerol, **4** Phosphatreste.
Mitte: ein bakterielles und ein eukaryotisches Phospholipid: **5** Fettsäure, **6** Esterbindung, **7** D-glycerol, **8** Phosphatreste.
Unten: **9** Lipid Bilayer von Bakterien und Eukaryoten, **10** Lipid Monolayer der Archaeen.



Chemical Biomarkers in Aquatic Ecosystems

THOMAS S. BIANCHI & ELIZABETH A. CANUEL



Free fatty acid (FFA)

Wax ester (WE)

Triacylglycerol (TG)

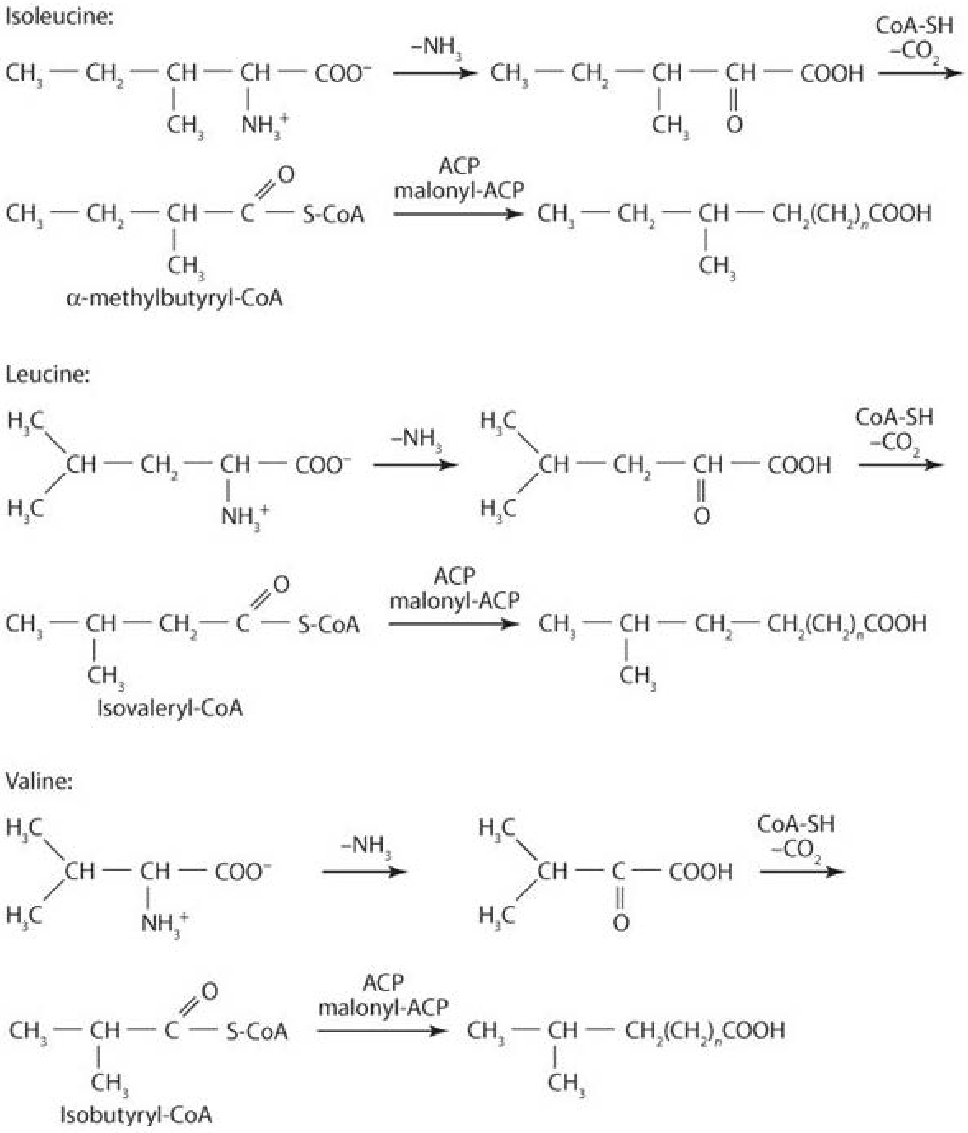
Phosphatidylcholine (lecithin)

Phosphatidylethanolamine (cephalin)

Phospholipid (PL)

Phospholipide

Fettsäuren mit verzweigten Ketten



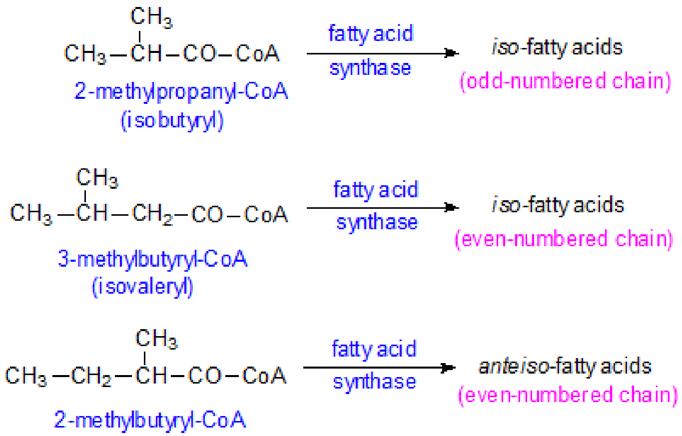
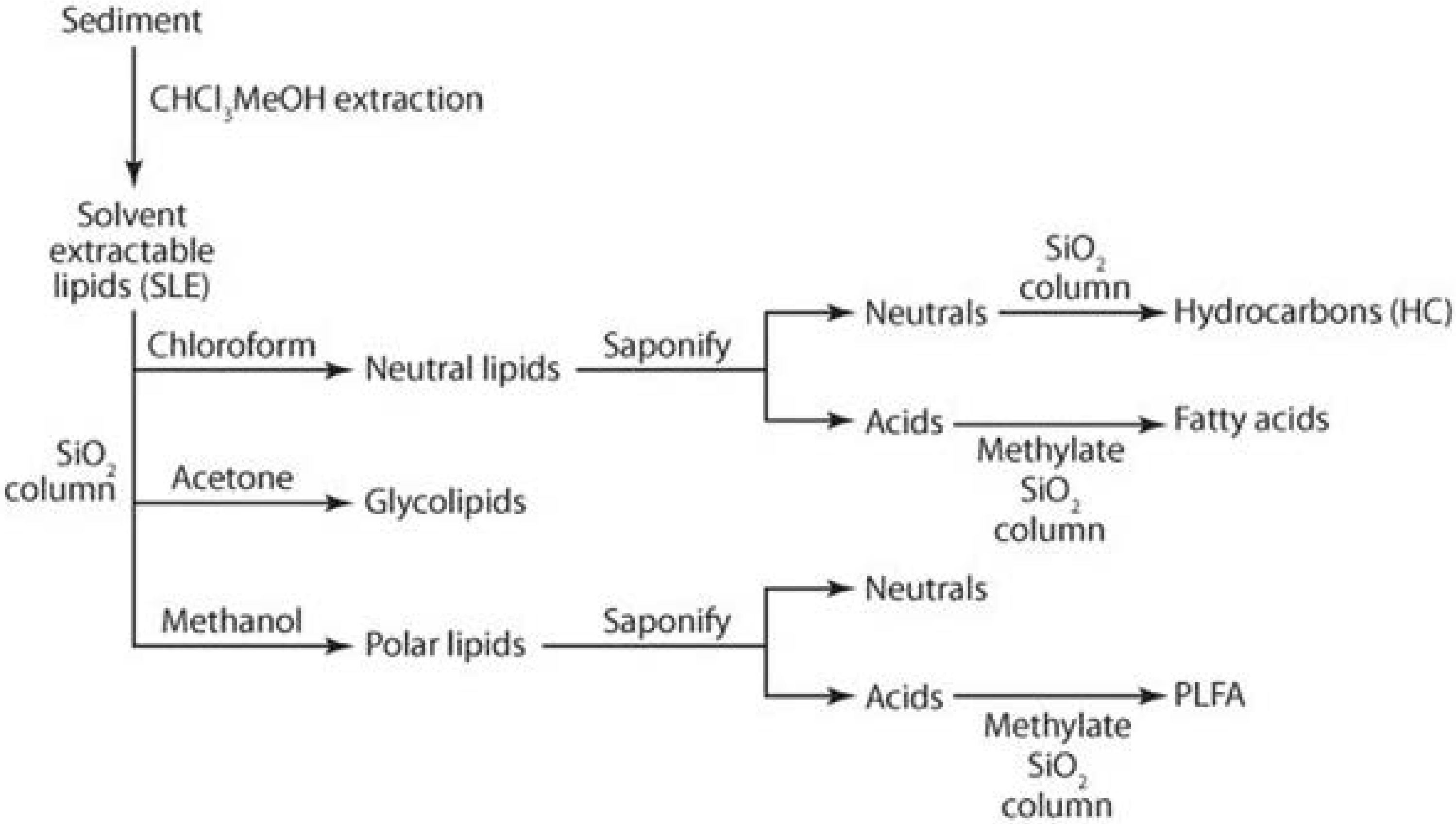


Table 8.1
Structural features of fatty acids and their use as source indicators

Feature	*Source*
Short chain (14:0, 16:0, 18:0)	Nonspecific (marine and terrigenous; bacteria, plants, and animals)
Long chain (24:0, 26:0, 28:0)	Higher (vascular) plants
Monounsaturated short chain (16:1 and 18:1)	Generally, nonspecific However, isomers may be source-specific
18:1ω7 (*cis*-vaccenic) is abundant in, but not exclusive to, bacteria	
18:1ω9 (oleic acid) animals, higher plants and algae	
16:1 ω7: bacteria	
16:1ω9: algal	
Polyunsaturated	
20:4, 20:5, 22:4, 22:5, 22:6	Marine and aquatic phytoplankton, zooplankton and fish
18:2 and 18:3	Higher plants and algae
Methylbranched chains (iso and anteiso)	Bacteria
Internally branched and cycloalkyl	
10-methyl isomers of 16:0 and 18:0	Fungi and bacteria
cyclopropyl 17:0 and 19:0	Eubacteriia
Hydroxy	
α-hydroxy (2-hydroxy)	Intermediates in oxidation of monocarboxylic acids
β-hydroxy (3-hydroxy)	Mostly bacteria, some cyanobacteria (predominantly C_{14}–C_{16}) and some microalgae
C_{15} and C_{17} β-hydroxy	Bacteria
C_{26} to C_{30} β-hydroxy	Eustigmatophytes
Diacids	
α, ω diacids	Higher plants Bacterial oxidation of other compounds

Extraktion


Sediment
$CHCl_3MeOH$ extraction
Solvent extractable lipids (SLE)
SiO_2 column
Chloroform
Neutral lipids
Saponify
Neutrals
SiO_2 column
Hydrocarbons (HC)
Acids
Methylate SiO_2 column
Fatty acids
Acetone
Glycolipids
Methanol
Polar lipids
Saponify
Neutrals
Acids
Methylate SiO_2 column
PLFA

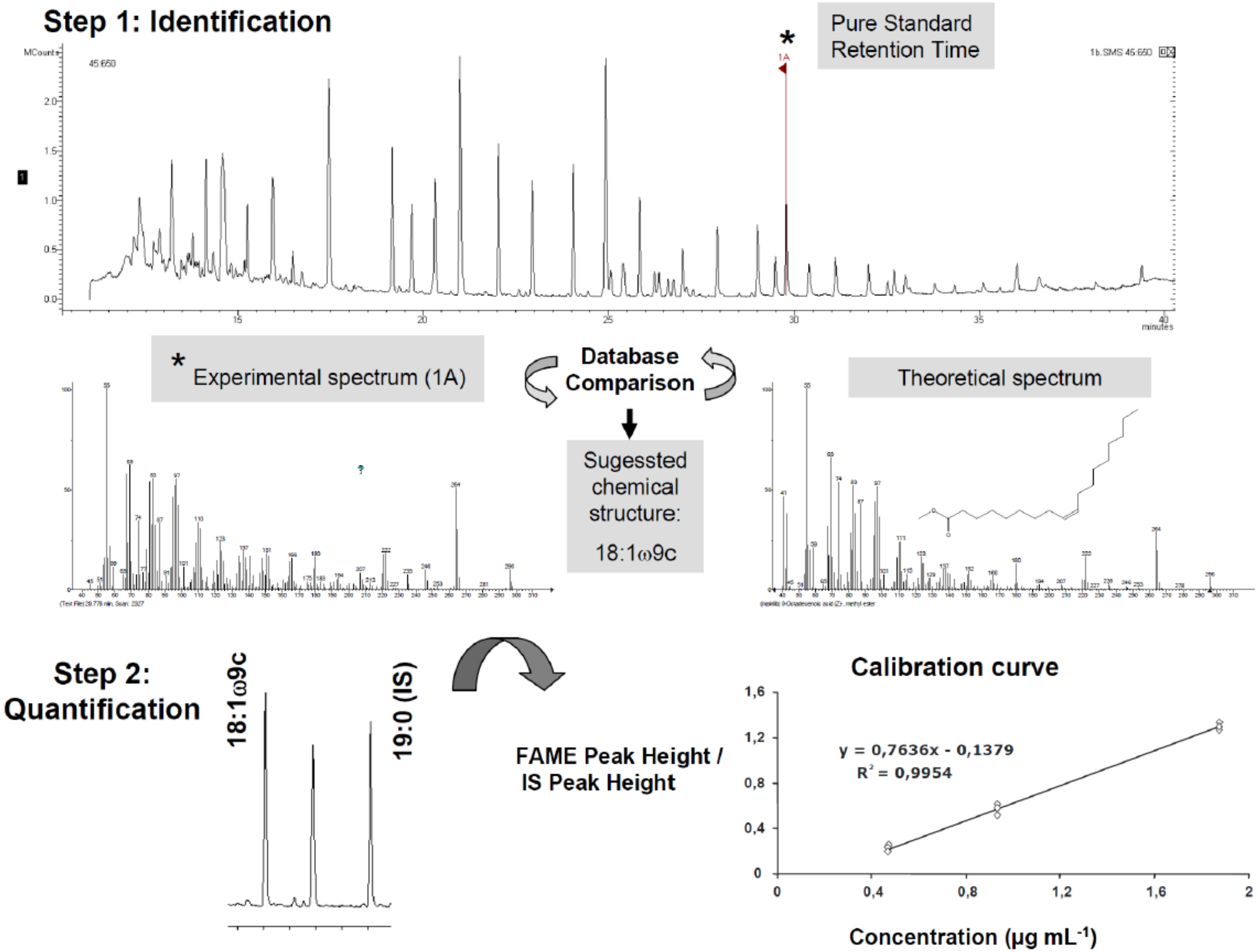


Figure 3. Identification and cuantification of FAMES by means of gas cromatography-mass spectrometry.