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Article

A novel and efficient method for the synthesis of Methyl (*R*)-10-hydroxystearate and FAMEs from sewage scum

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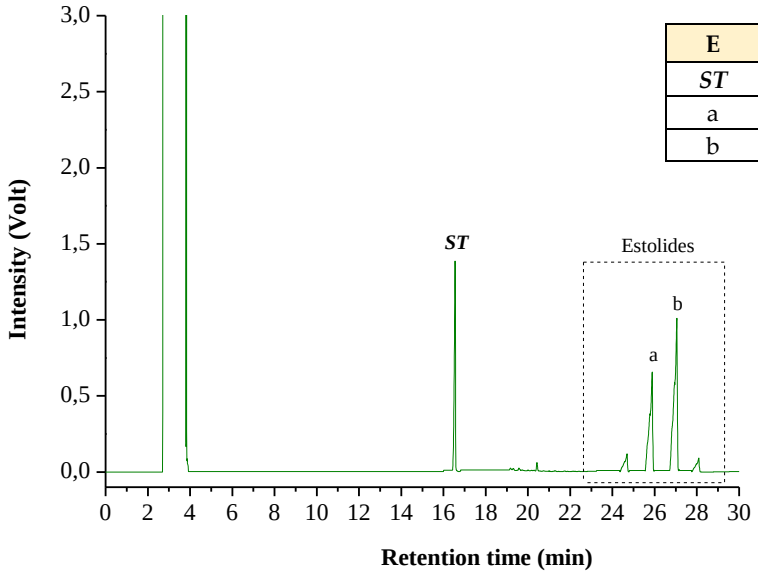


E	Compound	t_R (min)
ST	*methyl heptadecanoate*	*16.5*
a	10-(palmitoyloxy)-stearic methyl ester	25.0
b	10-(stearoxy)-stearic methyl ester	27.0

Figure S1. GC-chromatogram of methyl estolides isolated by distillation process.

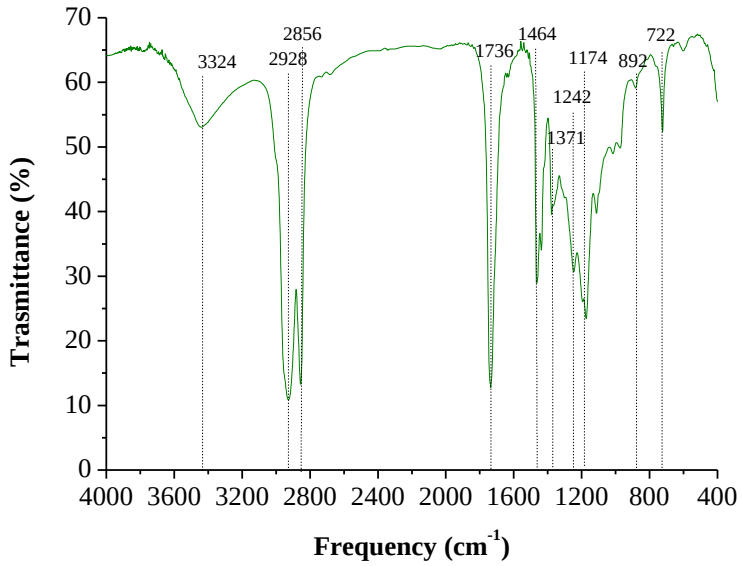


Figure S2. FTIR spectra of methyl estolides.

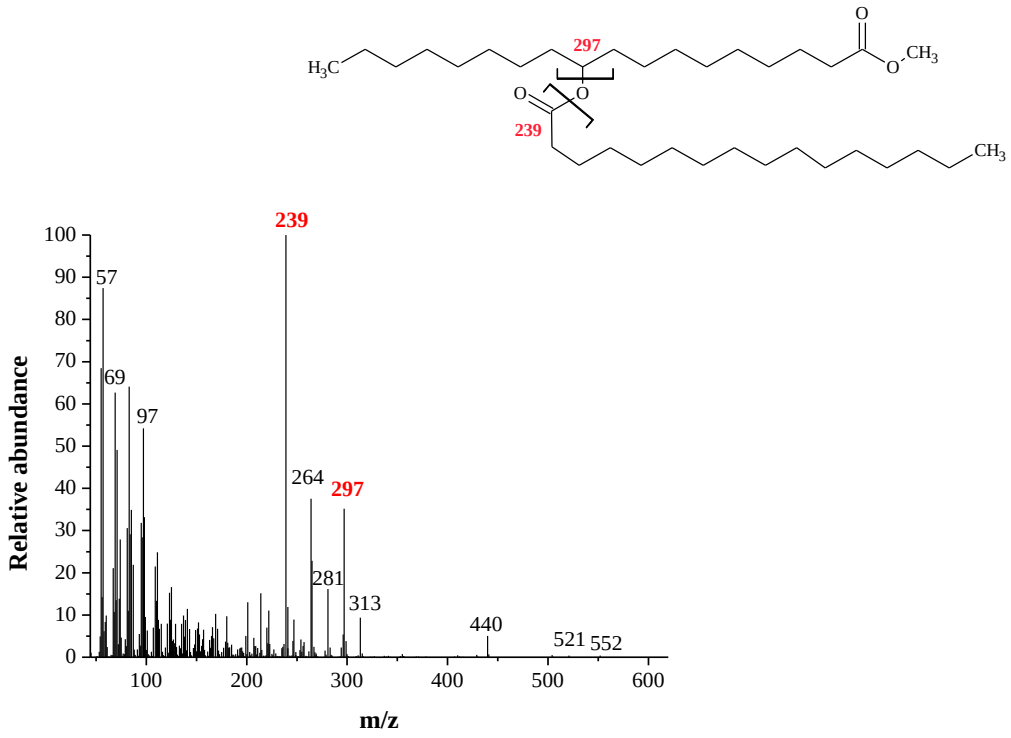


Figure S3. GC-MS chromatogram of 10-(palmitoyloxy)-stearic methyl ester.

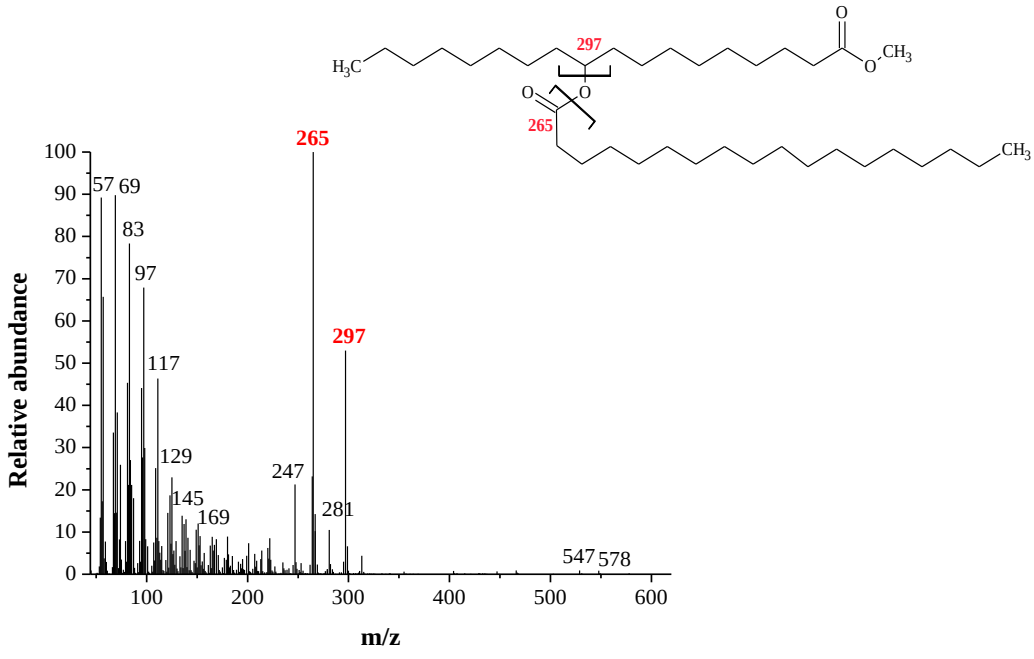
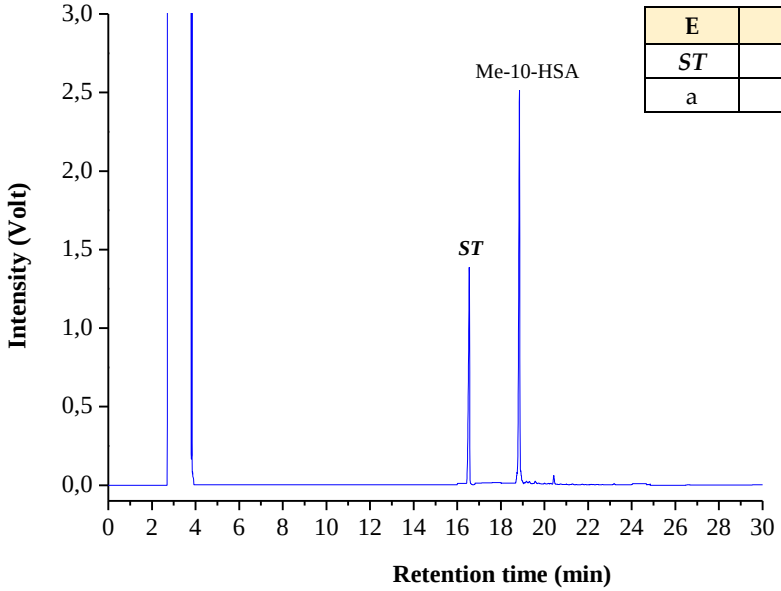


Figure S4. GC-MS chromatogram of 10-(stearoyloxy)-stearic methyl ester.



E	Compound	t_R (min)
ST	***methyl heptadecanoate***	***16.5***
a	methyl 10-(*R*)-hydroxystearate	18.8

Figure S5. GC-chromatograph of methyl 10-(*R*)-hydroxystearate isolated.

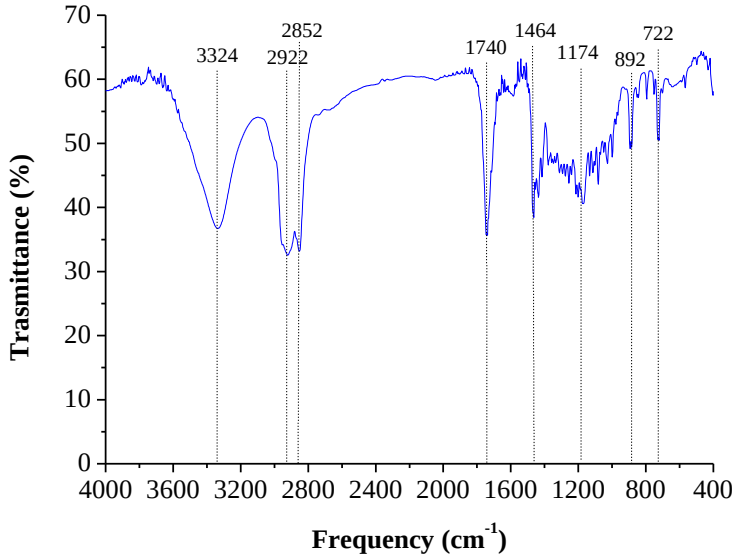


Figure S6. FTIR spectra of methyl 10-(*R*)-hydroxystearate.

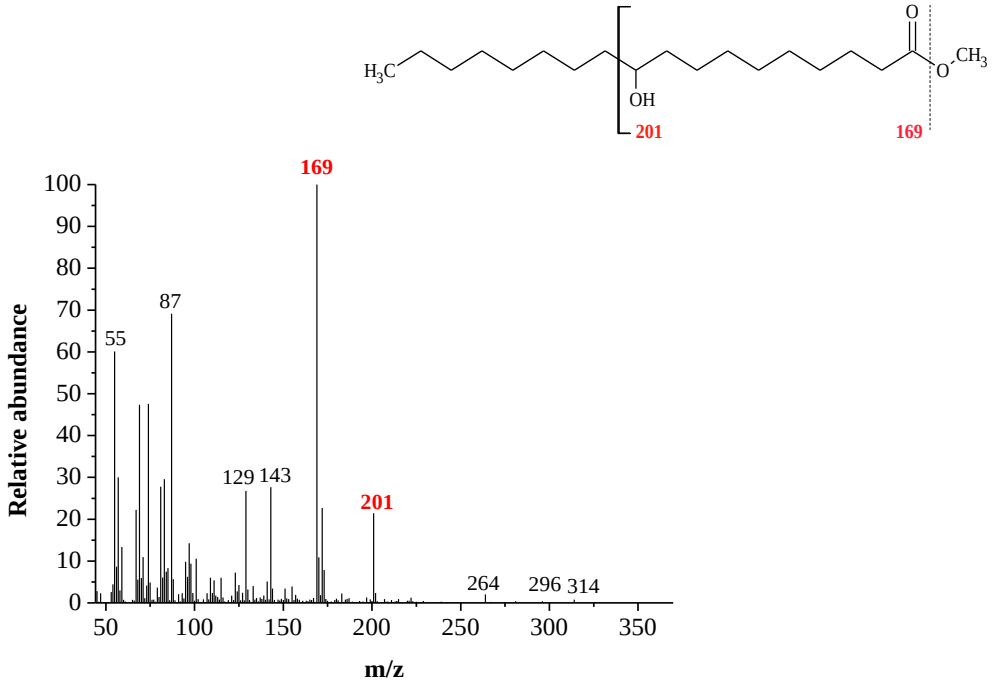


Figure S7. GC-MS chromatogram of methyl 10-(*R*)-hydroxystearate.

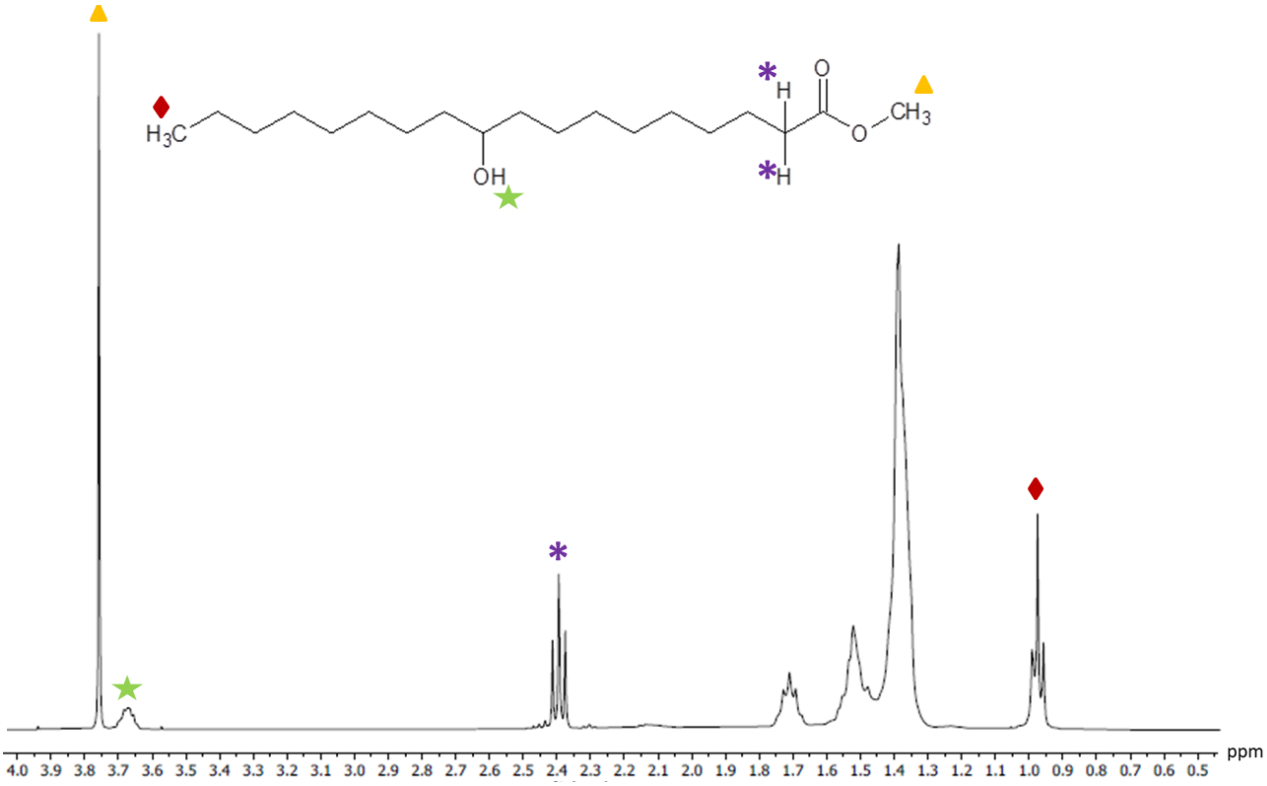
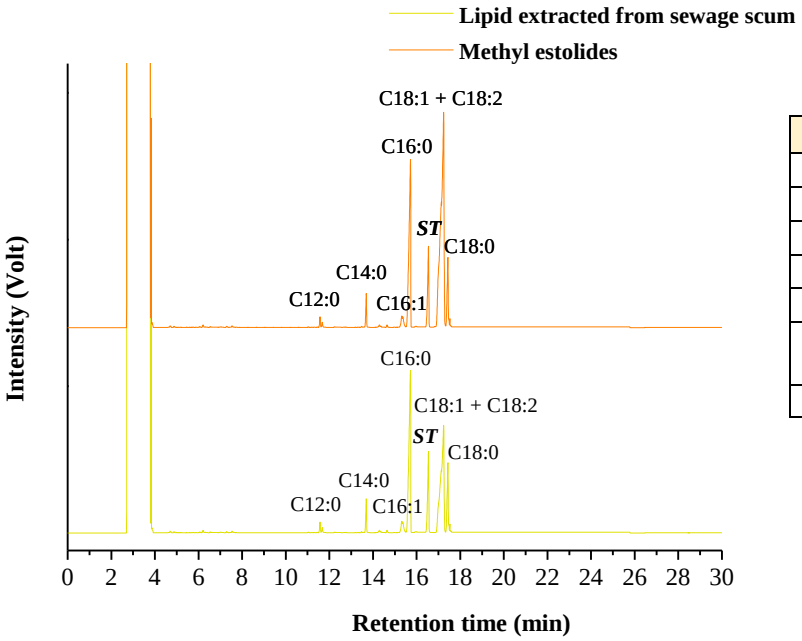


Figure S8. ^{1}H NMR of methyl 10-(*R*)-hydroxystearate.



E	Compound	t_R (min)
C12:0	methyl laureate	11.6
C14:0	Methyl myristate	13.7
C16:1	Methyl palmitoleate	15.3
C16:0	Methyl palmitate	15.7
ST	**methyl heptadecanoate**	***16.5***
C18:1 + C18:2	Methyl oleate + methyl linoleate	17.3
C18:0	Methyl stearate	17.5

Figure S9. Comparison of chromatographic profiles of FAs obtained from methyl estolides and lipids extracted from sewage scum.

Determination of the absolute configuration of Methyl-10-hydroxy stearic acid. In order to evaluate the absolute configuration of the isolated Methyl 10-Hydroxy stearic acid, three derivatizing agents were adopted: (*R*)-1-phenyl-ethyl-isocyanate (D1), (*S*)-1-phenyl-propyl-isocyanate (D2) and (*S*)-O-Acetyl-mandelic acid (D3). Diastereoisomeric compounds were analyzed and compared with the analogous derived from racemic mixtures through GC-FID and ^{1}H NMR, as recently described [28].

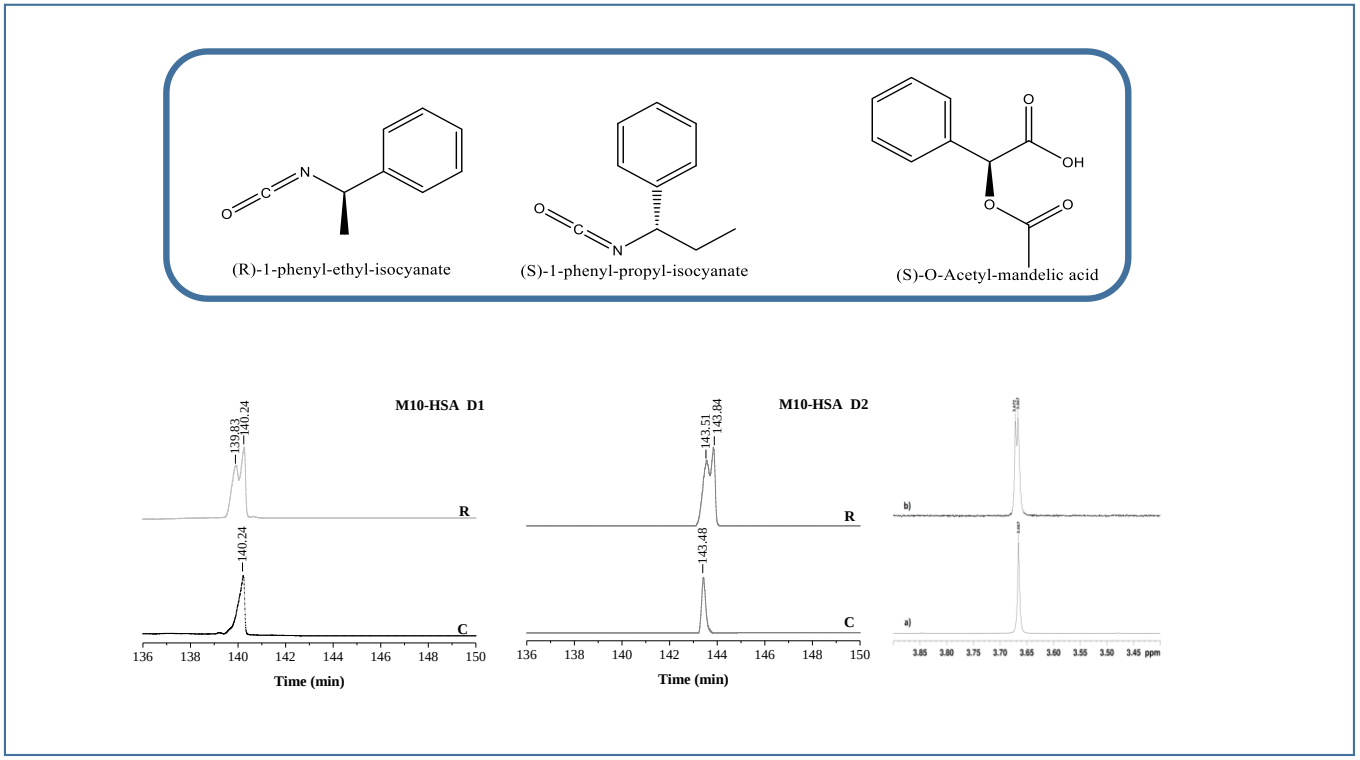


Figure S10. Chemical structures of derivatizing agents (D1, D2 and D3) used for the determination of the absolute configuration of the Methyl 10-Hydroxy stearic acid (M10-HAS) isolated from sewage scum. Comparison of GC-FID chromatograms (10HSA D1 and 10HSA D2) obtained from the isolated M10-HAS (c traces) and racemic sample (R traces). Traces a) and b) were referred to ^{1}H NMR of diasteroisomers obtained from reaction of M10-HAS and D3 and racemic M10-HAS and D3, respectively, as described in *Yang et al., App. Environ. Microb. 1993, 59, 281–284 and in di Bitonto et al. Bioresour. Technol. Rep.* **2020**, *9*, 100382.