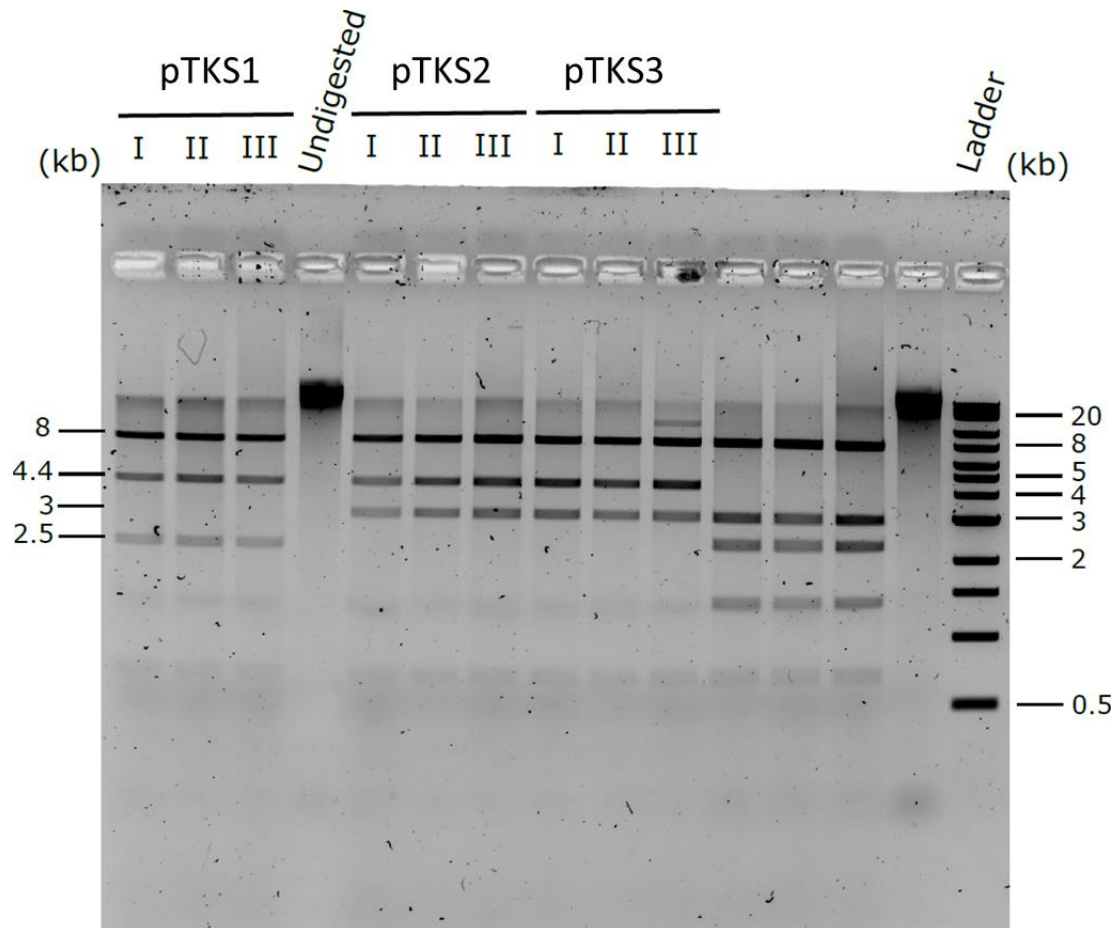
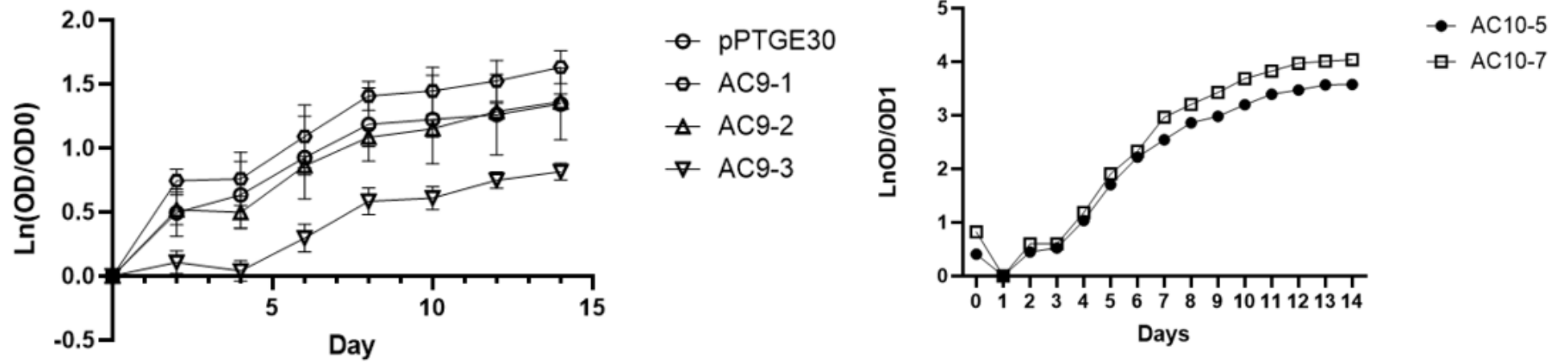


Supplementary Information

Impact of heterologous expression of *Cannabis sativa* tetraketide synthase on *Phaeodactylum tricornutum* metabolic profile

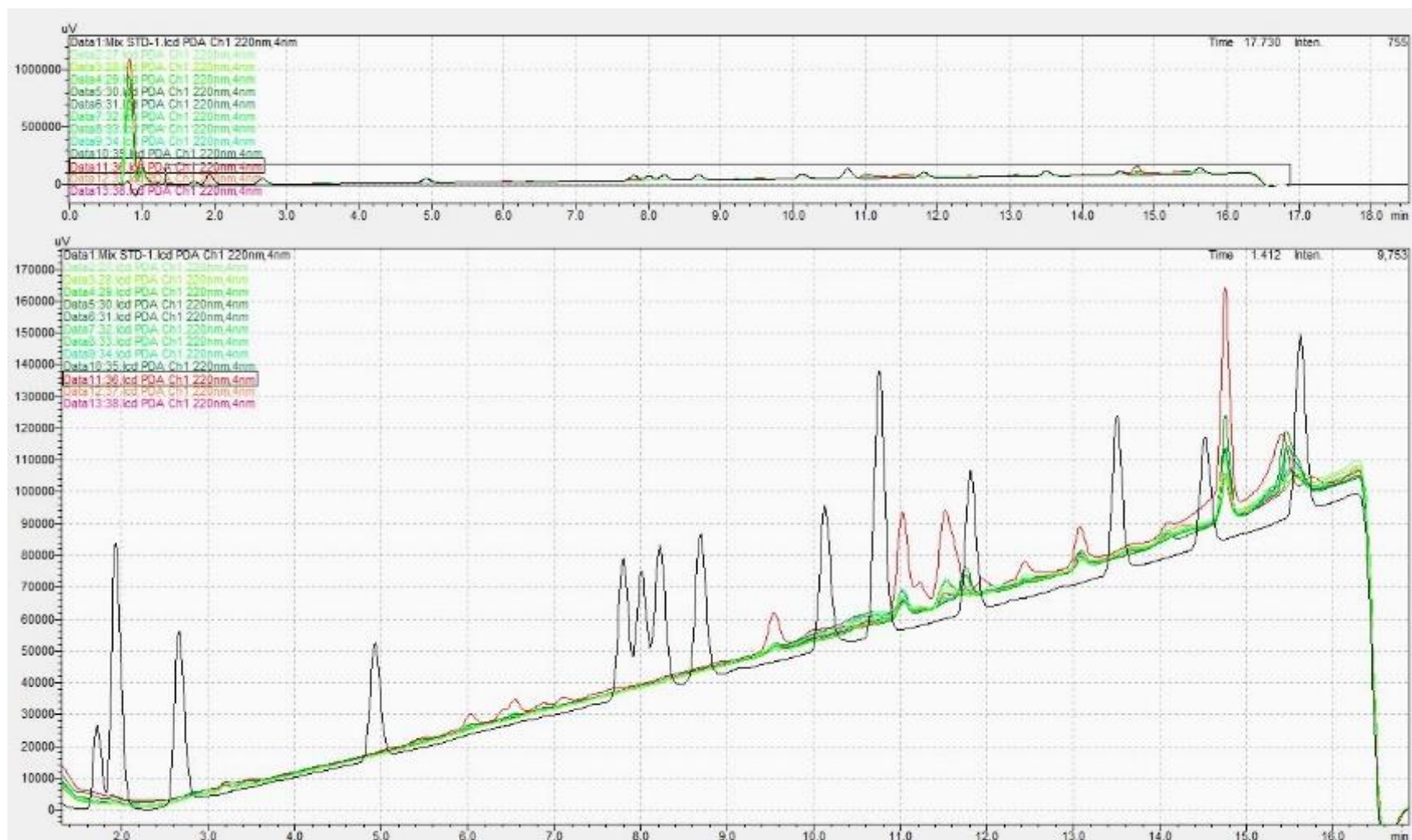


Supplementary Figure 1: *P. tricornutum* DNA plasmid digestion profiles. Agarose gel electrophoresis profile *Bam*HI-HF digestion recombinant plasmid DNA extracted from *E. coli* after plasmid rescue from *P. tricornutum* transconjugants.

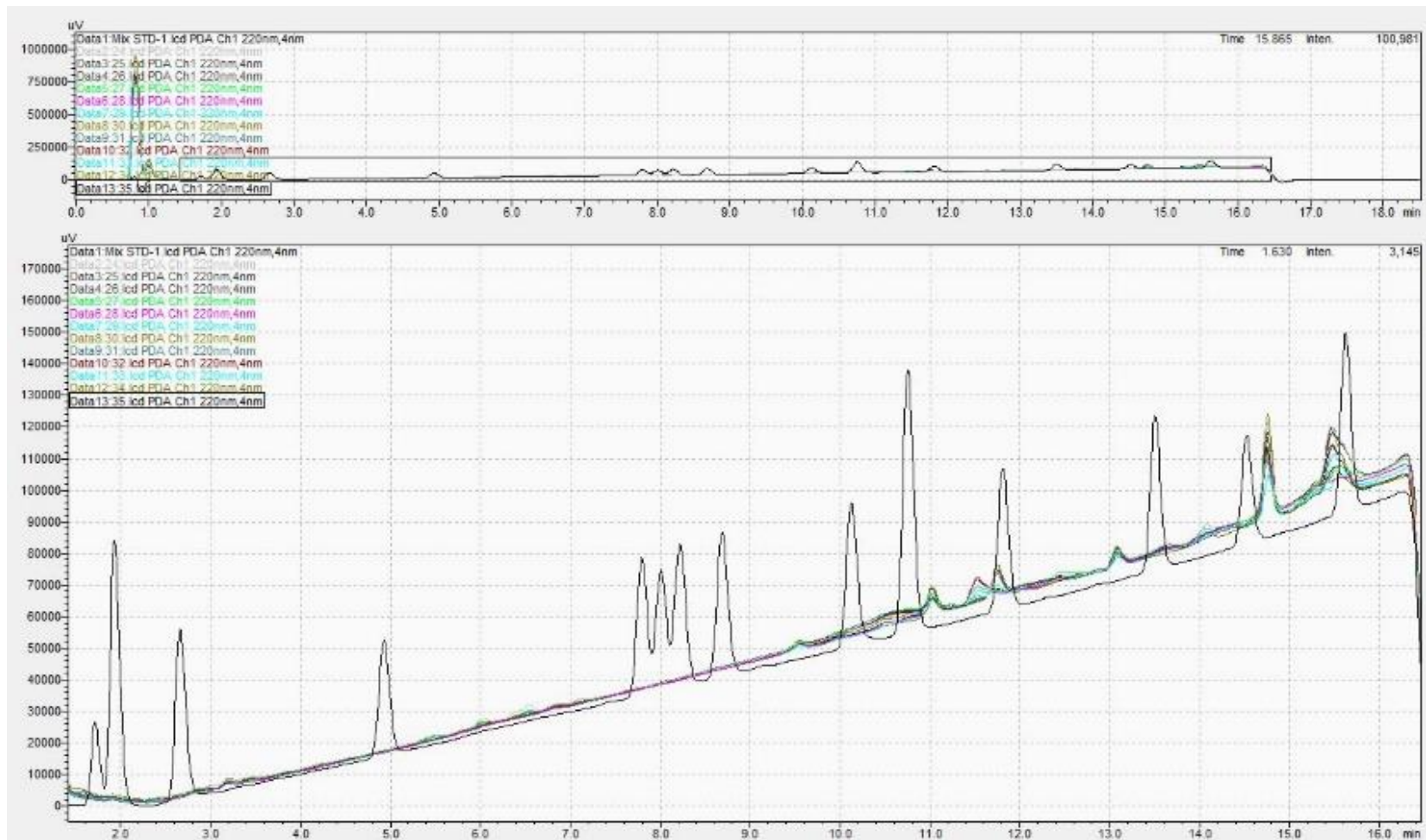


Supplementary Figure 2: CsTKS and empty vector clones have a similar growth kinetic. Optic density of each culture was taken at 730 nm and a t-test was performed for statistical analysis.

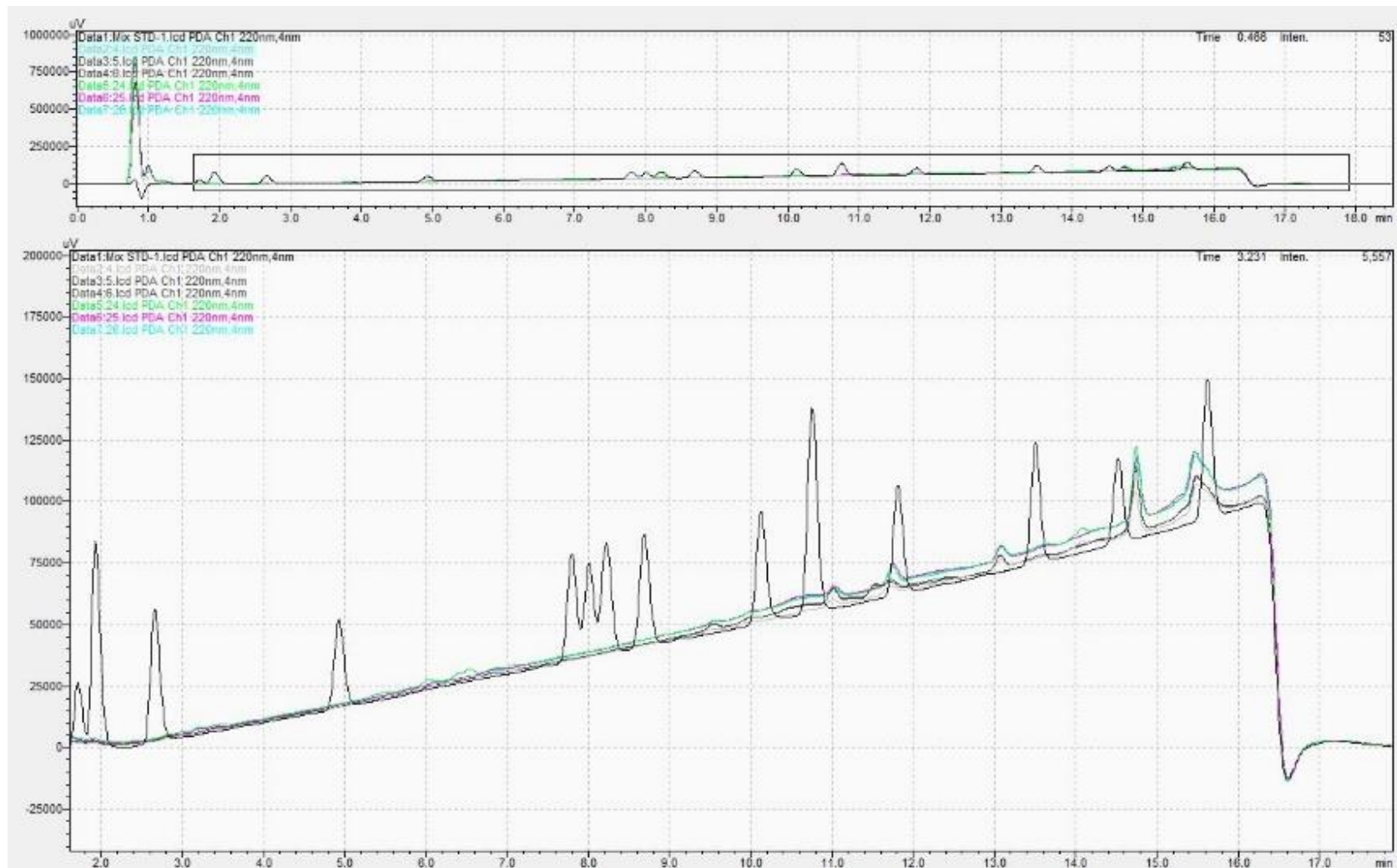
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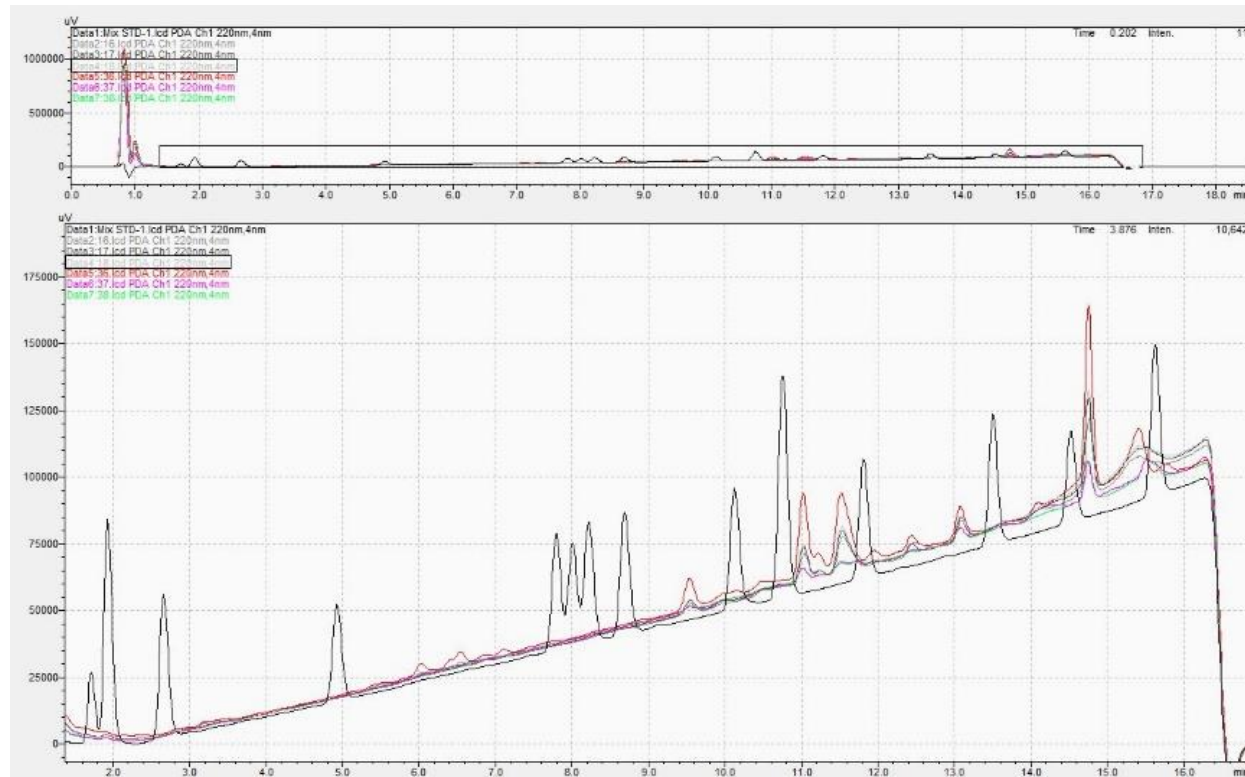
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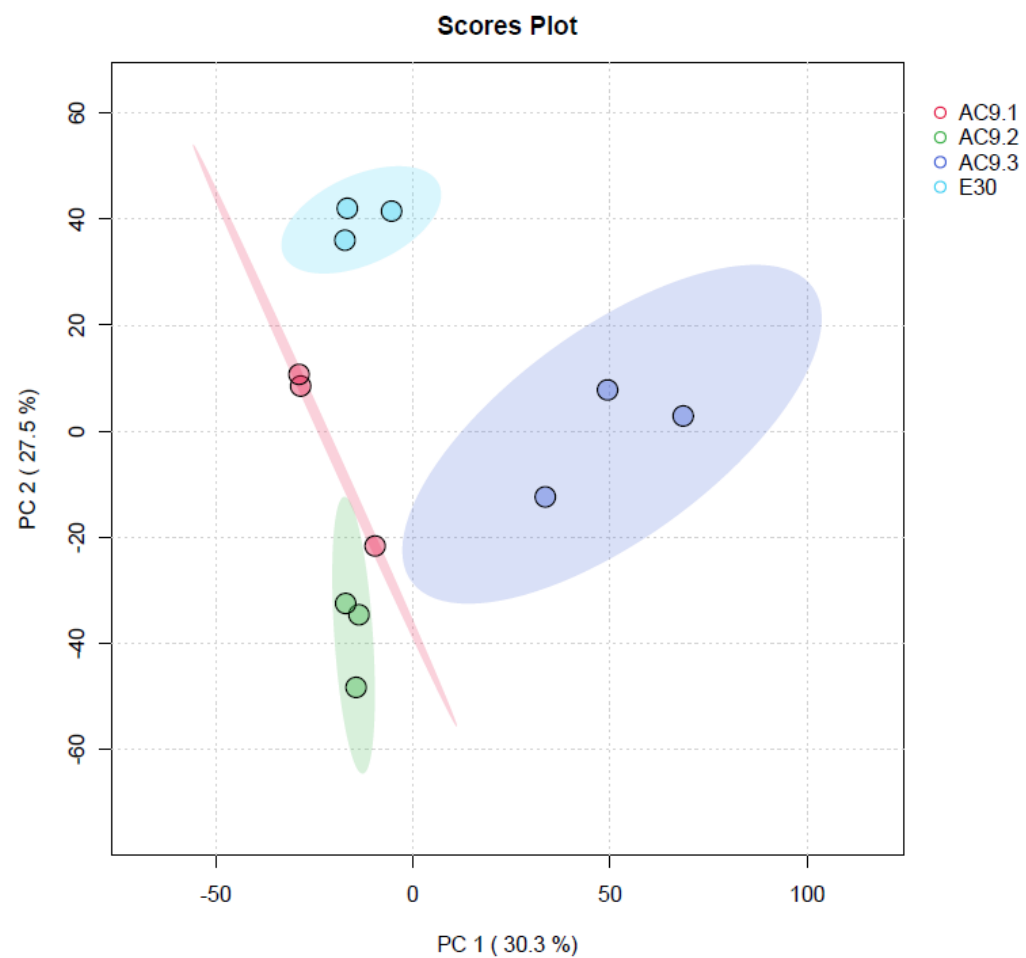
c)



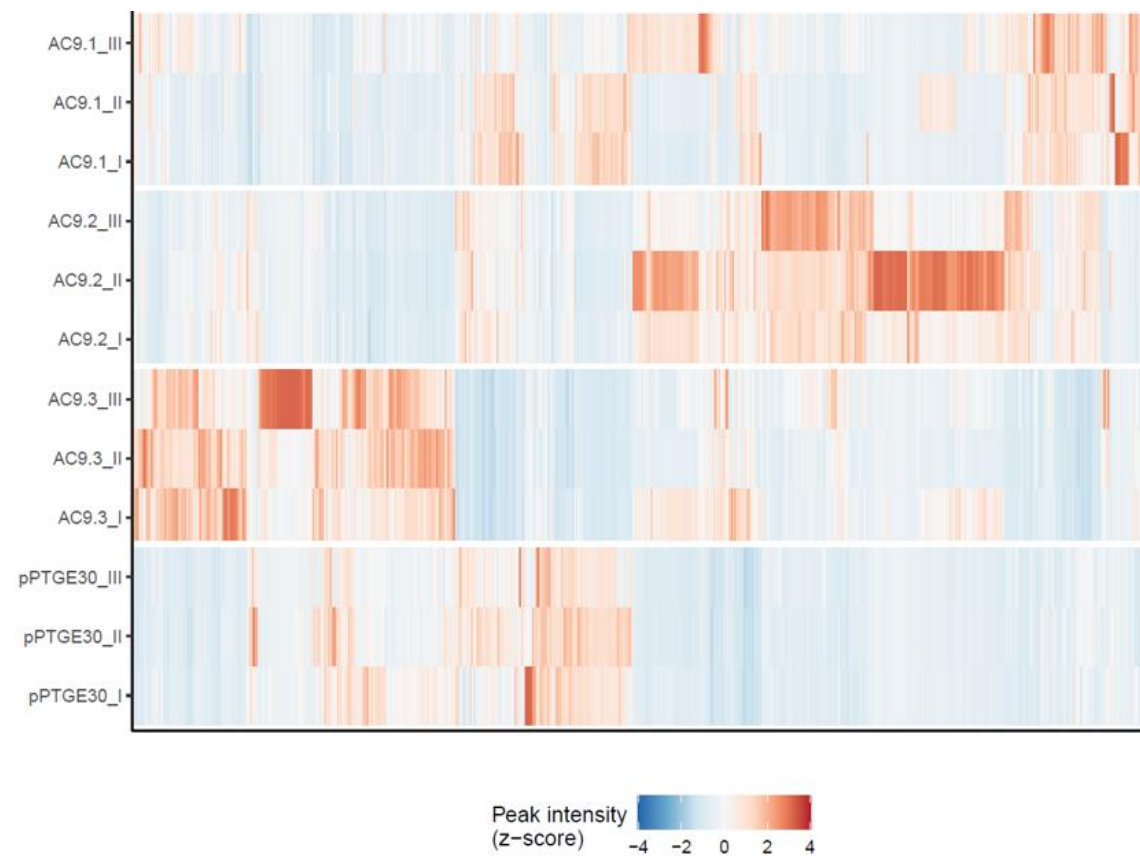
d)



Supplementary Figure 3: HPLC chromatogram of *Cs*TKS and *Cs*OAC enzymatic assays. The black line corresponds to the run with cannabinoid standards. **a:** Chromatogram of enzymatic assay from crude extract of AC9.1, AC9.4, AC10.5 (*Cs*OAC) and the Combined (*Cs*TKS + *Cs*OAC) culture made of all three clones mixed, all supplemented with hexanoyl-CoA and malonyl-CoA. Each clone has previously been tested for protein production by western blot. The two peaks visible between 11 mins and 12 mins do not correspond to any cannabinoid standard's UV profile. **b:** Chromatogram of pTKS.1, pTKS.4, pOAC.5 and EV enzymatic assays All clones follow the same profile. **c:** Chromatogram of pPtGE30 with and without substrate. **d:** Chromatogram of Combined clones with and without substrate.



Supplementary Figure 4: AC9.3 has a more distant metabolite profile than the 3 other clones: Principal component analysis of every clone's metabolite profile by combining HILIC, Reverse phase positive and negative mode.



Supplementary Figure 5: All triplicates of each clone follow a similar profile. Heatmap of unannotated metabolite relative abundance in each clone compared to the mean in all samples.

Supplementary Table 1: All DNA sequences used in this study.

Identity	Sequence
pPtGE30	ACTAAGGGTACTGTTGACATTGCGAAGAGCGACAAAGATTTGTTATCGGCTTTATTGCTCAAAGAGACATGGGTGGAAGAGATGAAGGTTACGATTGGTTGATTATGACACCCGGTGTGGGTTTAGATGACAAGGGAGACGCAT TGGGTCAACAGTATAGAACCGTGGATGATGTGGTCTCTACAGGATCTGACATTATTAATTGTTGGAAGAGGACTATTGCAAAGGGAAGGGATGCTAAGGTAGAGGGTGAACGTTACAGAAAAGCAGGCTGGGAAGCATATTTGAG AAGATGCGGCCAGCAAACTAAAAAAGTATTTATAAGTAAATGCATGTATATACTAACTCACAATTAGAGCTTCAATTTAATTATATCAGTTATTAACCGGCCGGGAATCTCGGTCGTAATGATTTTTATAATGACGAAAAA AATTGGAAGAAAAACCCCCCCCCCGCAGCGTTGGGTCTGGCCACGGGTGCGCATGATCGTGCTCTGTCGTTGAGGACCCGGCTAGGCTGGCGGGGTTGCCTTACTGTTAGCAGAATGAATCACCAGATACGCGAGCGA ACGTGAAGCGACTGCTGCTGCAAAACGTCTGCGACCTGAGCAACAACATGAATGGTCTTCGGTTTCCGTTTTCGTAAGAGCTGGAACGCGGAAGTCAGCGCCCTGCACCATTATGTTCCGGATCTGCATCGCAGGATGCTGCTG GCTACCTGTGGAACACCTACATCTGTATTAACGAAGCGCTGGCATTGACCTCGAGTGATTTTTCTCTGGTCCCGCGCATCCATACCGCCAGTTGTTTACCCTCACAACGTTCCAGTAACCGGGCATGTTTCATCATCAGTAACCCGTA 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	CTGCAGGCATGCAAGCTTGAGTATTCTATAGTCTCACCTAAATAGCTTGGCGTAATCATGGTCATAGCTGTTTCTGTGTGAAATTGTTATCCGCTCACAATTCCACACAACATACGAGCCGGAAGCATAAAGTGTAAGGCTGGGGTGCCTAATGAGTGAGCTAACTACATTAATTGCGTTGCGCTCACTGCCGCTTTCCAGTCGGGAAACCTGTCGTGCCAGCTGCATTAATGAATCGGCCAACGCGAACCCCTTGCGGGCCGCGGGCCGTCGACCAATTCTCATGTTTGACAGCTTATCATCGAATTTCTGCCATTATCCGCTTATTATCACTTATTAGGCGTAGCAACCAGGCGTTTAAGGGCACCAATACTGCCTTAAAAAATTACGCCCGCCCTGCCACTCATCGAGTACTGTTGTAATTCATTAAGCATTCTGCCGACATGGAAGCCATCACAACGGCATGATGAACCTGAATCGCCAGCGGCATCAGCACCTTGTCGCTTTCGTATAATTTGCCCATGGTGAACGGGGGCGAAGAAGTTGTCCATATTGCCACGTTTAAATCAAAC TGGTGAAACTCACCAGGGATTGGCTGAGACGAAAAACATATTCTCAATAAACCTTTAGGGAAATAGGCCAGGTTTTCACCGTAACACGCCACATCTTGCGAATATATGTGTAGAAACTGCCGGAATCGTCGTGGTattcactccagagcgatgaaaacgtttcagtttgctcatggaacggtgtaACAAGGGTGAACACTATCCCATATCACCAGCTCACCCTTTCATTGCCATACGAAATTCGGATGAGCATTATCAGGCGGGCAAGAATGTGAATAAAGGCCGATAAACTTGTGCTTATTTTCTTTACGGTCTTAAAAAGGCCGTAATATCCAGCTGAACGGTCTGGTTATAGGTACATTGAGCAACTGACTGAAATGCCTCAAATGTTCTTTACGATGCCATTGGGATATATCAACGGTGGTATATCCAGTGATTTTTTCTCCATTTTAGCTTCCTTAGCTCCTGAAAACTCTCGATAACTCAAAAAATACGCCCGGTAGTGATCTTATTTCAATTATGGTGAAAGTTGGAACCTCTTACGTGCCGATCAACGTCTCATTTTCGCGAAAAAGTTGGCCAGGGCTTCCCGGTATCAACAGGGACACCAGGATTTATTTATCTGCGAAGTGATCTTCCGTACAGGTATTATTGCGGATAAGCTCATGGAGCGGCGTAACCGTCGCACAGGAAGGACAGAGAAAGCGCGGATCTGGGAAGTGACGGACAGAACGGTCAGGACCTGGATTGGGGAGGCGGTTGCCGCCGTGCTGCTGACGGTGTGACGTTCTCTGTTCCGGTCACACCACATACGTTCCGCCATTCTATGCGATGCACATGCTGTATGCCGTATACCGCTGAAAGTTCTGCAAAGCCTGATGGGACATAAGTCCATCAGTTCAACGGAAGTCTACACGAAGGTTTTTTCGCGTGAGTGCGCTGCCCGCACCGGGTGACGTTTTCGATGCCGGAGTCTGATGCGGTTGCGATGCTGAAACAATATCTCTGAGAATAAATGCTTGGCCTTTATATGGAATGTGGAAGTGAAGTGGATATGCTGTTTTGTCTGTTAAACAGAGAAGCTGGCTGTTATCCACTGAGAAGCGAACGAAACAGTCGGGAAAAATCTCCCATATCGTAGAGATCCGCATTATTAATCTCAGGAGCCTGTGTAGCGTTTTATAGGAAGTAGTGTTCTGTATGATGCTCGAAGCGGTAAACGAAACGATTTGAATATGCCCTCAGGAACAATAGAAATCTTCGTGCGGTGTACGTTGAAGTGAGCGGATATGTCTCAGCAATGGACAGAA CAACCTAATGAACACAGAACCATGATGTGGTCTGCTCTTTTACAGCCAGTAGTGCTCGCCGAGTCGAGCGACAGGGCGAAGCCCATCGATACTAGCTTGATTGGGATATCTCGCTCGTGCTTGTGCGGTGCTATGCTTTTTTAGGGTACTTTGAACCTACGTTCTGACTTTGTGAATATGATCATGCTGTCATGCTATTATCGTTTTTTCATCCGTCACGCGCAAAATGCATTAGCAGCTAGTCTAGCGTGCAGGCTACCTGTACAGGTGCATGACGGATGCGGTGCTTAAAGT GAGTTTCTAATTAACAGTAACCTCTTACTATGTTTTAGTTTTGTAAGAAGCGGGATGCGCTGCTGCTTGACATCTGATTGACTGCGTCGGCAGCTGAAAACTACATTGTGAAATCTGCTAAAACTCCGGGTATCTCTGACACAAA ACGATTCCGGCTTCGCAATTTCAACATTACGGTCAAGGCTAACGTATCTTCTCGGTCAACTTCAGATTATGCCGATTAAATGTGCTAGCTTTCAAGGCGTTTTGAGTACTGCGGCAGTTGTTGAACCTGCAAGGAGAAGATCTCGAC AACAGAATAAAGCGAAAAATGGGTCTCATGCACTAACACTCAGGCCCTCCCTCATAATCTCTGTTGAGTTTACCAACAACACATATATACATTTGACAAAAATGGCCAAAGTTGACCAGTGCCGTTCCGGTGCTCACCGCCGCGCAGC TCGCCGGAGCGGTGAGTTCTGGACCGACCGGCTCGGTTCTCCCGGGAATCTGTGGAGGACGACTTCGCCGGTGTTGTCGGGACGACGTGACCTGTTCATCAGCGCGGTCCAGGACCAAGGTGTGCCAGACAACACCTGTG CCTGGGTGTGGGTGCGCGGCTGGACGAGCTGTACGCCGAGTGGTTCGGAGGTGCTGTCCACGAACTTCCGGGACGCTCCGGGCGGCCATGACCGAGATCGGCGAGCAGCCGTGGGGGCGGGAGTTCGCCCTGCGCGAC CCGGCCGCAACTGCGTGCACTTCTGTGGCCGAGGAGCAGGACTGACCGACGCCGACCAACACCGCCGGTCCGACGCGGCCGACGGTCCGAGGCTCGGAGATCTGGGCCATGCGGCCGCAACAACCTACCTCGACTTTGG CTGGGACACTTTAGTGAGGACAAGAAGCTTCAGAAGCGTGCTATCGAAGTCAACACAGGAGCGTGCGGCACAAATGGGCATCCTTGCTCTCATGTTGACGAACAGTTGGGAGTCTCTATCCTTCTTAAAAATTTAATTTCAATT AGTTGCAGTCACTCCGCTTTGGTTTCGTAACATAACGGTCTTAAGGTAGCGAACGTTGACAGGCCATGCTGTCCAGGCGAGGTAGATGACGACCATCAGGGACAGCTTCAAGGATCGCTCGCGGCTCTTACCAGCCTAACTTCGATC ATTGGACCGCTGATCGTCACGGCGATTATGCCGCTCGCGGAGCAGTGAACGGGTTGGCATGATTGAGGCGGCCCTATACCTTGTCTGCTCCCGGCTTGCGTCGCGGTGATGGAGCCGGGCCACTCGCACTGAAAT GGAAAGCCGCGGCACCTCGCTAACGGAATTCACCACTCCAAGAATTGGAGGCCAATCAATCTTTCGCGGAGAACTGTGAATGCGCAAAACCAACCTTGGCAGAAATATCCATCGCTCGGCCATCTCCAGCAGCCGACGCGCGCA TCGGGGGGGGGGGGTTCAATTCATCATTTTTTTTTTATTCTTTTTTTGATTTTCGGTTTCTTGAAATTTTTTTGATTTCGTAATCTCCGAACAGAGAAGGAAGCAAGGAAGGAGCAGACTTAGATTGGTATATACGCATA TGATGTGTTGAAGAAACATGAAATTGCCCAGTATTCTTAACCAACTGCACAGAACAAAAACCTGCAGGAAACGAAGATAAATCATGTGCAAAAGCTACATATAAGGAACGTGCTGCTACTCATCCTAGTCTGTTGCTGCCAAGCTA TTAATATCATGCACGAAAAGCAAAACAACTTGTGTGCTTATTGGATGTTCTGATCCACCAAGGAATTACTGGAGTTAGTTGAAGCATTAGGTCCCAAAATTTGTTTACTAAAAACATGTGGATATCTTGACTGATTTTTCCATGGA GGGCAGAGTTAAGCCGCTAAAGGCATTATCCGCCAAGTACAATTTTTTACTCTTGAAGACAGAAAAATTTGCTGACATTGGTAATACAGTCAAATTCAGTACTCTGCGGGTGATACAGAAATAGCAGAATGGGACAGATTACGAA TGACACGGGTGTGGTGGGCCAGGTATTGTTAGCGGTTTGAAGCAGGCGGCGGAAGAAAGTAACAAAGGAACCTAGAGGCCTTTTGATGTTAGCAGAATTGTCATGCAAGGGCTCCCTAGCTACTGGAGAATAT
TKS cassette	CCCTGCGATAGACCTTTTCCAAACTCAGCAGTCCAAGAAAAACAAAGGGGTGAGAAGTATACGCACCTTTTCGGTTTCGGCATAATTCTTAAACTCTTGTTGCTACTTTCTTGTAAGAAAGCTAGGGGCACTGTTTCCCTCAGAG CCTGCAAAACAAAAATTCCTGCAGTCAATTGTCCCAACTCGGCAAAACCGTATGCGCAAGCAACGATGCGCAGAAGGCCGTGGATGGATGGCGACTCGCGATATGGCTTCTTGGGTGCGCAGTGTTGGTACGTCGGCGTATGTC AATACGCGAATTCGGACGACTGGCATCTCTAGGAGGAGGATTCCCTCTTTATGACATGTTTATTTATATACATTGATGCTTTCCGACAGTCGGAAGTAATAAATGAATTTATTTCAAGACTACCTATACTCCTTTGACTTGTTGCGACTA ATCTTACCCTTACTAAAATCTCGAAATCAGCCTTGACCTCTCGCACGCAAAATTTTTGCTGCTGGACGCTACGCACTCGGCCCAATCTTCTCGGTCTCGTCGTCGAATTTGCTGTTGCGTTGATCTTGACCGGAAGGAATCAGAGA ATAGAATACCATGAACCACTGCGTGCCGAAGGACCGCCTCGTCTCGCCATTGGAACCGCCAAACCCGAAAAACATCTCTCCAGGACGAATTCGCCGACTACTACTTTCTGTGTACCAAGTCCGAACACATGACCCAGTTGAA GGAAAGTTCCGTAAGATTGTGACAAGTCCATGATTCTGAAGCTAATGCTCTTCTCAACGAGAAGAACCTCAAGCAGAACCCGCGCTCGTGCAGAACGAATGCAAAACCTCGACGCCGTGAGGACATGTTGGTTGTTGAA GTCCCCAAGCTCGGAAAGGACGCTGCGCCAAGGCCATTAAGGAATGGGGTCAACCTAAGTCCAAGATCACCCACCTGATCTTACCTCCGCTCCACCACCGATATGCCCGGAGCAGACTACCACTGCGCTAAGCTCTCGGACT CTCCCCCTCGTCAAGCGCGTCATGATGTACCAGCTCGGATGCTACGGAGGTGGAACCGTCTCTCGCATTGCTAAGGACATCGCCGAAAAACAAGGGTGCCCGTGCTTGGCCGTCTGCTGCGACATTATGGCTTGCTTTTTTC GTGGCCGCTCGAATCCGACCTCGAACTCTCGTTGGCCAGGCCATCTTGGCGCAGGTGTCGCCGCCGCTGATTGTGCGCGCCGAACCCGACGAATCCGTGCGCGAACGTCCTCATCTCGAACTCGTCTCCACCGGACAGACCAT CCTCCCAACTCCGAAGGAACCATGGAGGACACATCCGCGAAGCCGGTCTCATTTTCGACTTGCAACAAGGACGTCCCATGCTCATCTCGAACAACTTGAAGAGTGTTTGAATGAAGCCTTACCCGATTGGAATTTCCGACTG GAACTCATCTTCTGGATTACCATCCGGGAGGCAAGGCCATTCTTGATAAGGTTCGAAGTCCACCTCAAGTCCGACAAGTTGCTGATTCCCGTCACGTCTCTCCGAACACGGAACATGTCCTGCTCCAGGTCCTCTT CGTCATGGACGAACTCCGTAAGCGTTCTTGGAAGAAGGCAAAATCGACCACCGGTGACGGAATTGAATGGGGTGCTTGTTCGGTTTTTGACCGGGTTTGACCGTAGAACGCGTTGTTGCTCGCTCCGATTAGTACCAC

	CATCACCACCACCACTAACCGCAACAACACTACCTCGACTTTGGCTGGGACACTTTAGTGAGGACAAGAAGCTTCAGAAGCGTGCTATCGAACTCAACCAGGGACGTGCGGCACAAATGGGCATCCTTGCTCTCATGGTGACGAA CAGTTGGGAGTCTCTATCCTTCCTTAAAAATTTAATTTTCATTAGTTGCAGTCACTCCGCTTTGGTTT
OAC cassette	ACTAGCTTGATTGGGATATCTCGCTCATGTTTGTGCGGTGCTATGCTTTTTAGGTACTTTGAACCTACGTTCTGACTTGTATAATATGATCATCGTATTATCGTTTTTCATCCGTCCAGCGCAAAATGCATTAGCAGTAGTCTAGCGTG CGGAGCTACCTGgACAGGTGCATGACGGATGCGTGTCTTCAGTGAcTTTCTAATTAAACAGTAACCTCTTTACTTATGTTTCAGTTTGAAGAAGCGGGATTGCGTCTGCGGTTGACATCTGATTGGACTGCGTGGGCACaTGA AAAAC TACATTGTGAAATCTGCTAAAACTCCGGGTATCTCTGACACAAAACGATTCTGgCtTCgCAATTTCAACATTACGGTCAAGGCTAACGTATCTTTCTCGGTCAACTTCAGATTatGCCGAaTAAATTGTCGTAGCTTTCAAGGCGTTTTGA GTACTGCGGCAGTTGTTGAACCTGCAAGGAGAAGATCTCGACAACAGAATAaAGCGAAAAATGGGTCTCATGCACTAACACTCAGgCCTCCCTCATAATCTCTGTTtGAGTTTACCAACAACACATATATACATTTCGACAAAATGGC CGTCAAGCACTTGATGTTCTCAAGTTCAAGGACGAAATCACCGAAGCCCAGAAGGAAGAATTCTTCAAGACCTACGTCAACCTCGTCAACATCATTCCCGCCATGAAGGATGTTTACTGGGGAAAGGACGTACCCAGAAGAAC AAGGAAGAAGGTTACACCCACATCGTCAAGTCACCTTTGAATCCGTTGAAACCATCCAGGACTACATTATCCACCCGGCCACGTGCGGTTTCGAGAGCGTCTACCCTTCCTTTTGGGAAAAGTTGTTGATTTTCGACTACACCCCC CGTAAGGAACAGAAGTTGATTTCCGAAGAAGACCTCTAATTTTGTTACATTTACTGACTTCAAGGAGTCGAGGAATCGATACTGCCGTGTTTCCAGGATCCGAGGTTTCATAAATCTGTTAACGTTATAGAAACAGACTTACCTCT CCTACGCCATTACGTAATATTCGCAATATGCTATTCTCTCTGAAGACCAGGTTTATGTCTGCTGAAACTATTTCAATAAGTCAGCTGCACTTGACAGGGTTTACAAGGAAAGCGTGCTTTTTTTTCCAACGTAGGCGTCGCT TTCGTCGACTCTTACTCTTACATTACAGCCAATACTTACAATAGTAAAAAACCTGTGCTCGAGAGTGAAAACGTC
pTKS-1 sequenci ng	ATGGCCAAAGTTGACCAGTGCCGTTCCGGTGCTCACC GCGCGCAGCTGCGCGGAGCGGTGCGAGTTCTGGACCGACCGGCTCGGGTTCTCCCGGACTTCGTGGAGGACGACTTCGCCGGTGTTGGTCCGGGACGACGTGACCTT GTTTCATCAGCGCGGTCCAGGACCAGGTGGTGCCGGACAACACCTGGCTGGGTGTGGGTGCGCGGCTGGACGAGCTGTACGCCGAGTGGTGGAGGTCGTGTCCACGAACTTCCGGGACGCTCCGGGCGGCCATGACC GAGATCGGCGAGCAGCGGTGGGGGCGGGAGTTCCCTCTGCGGACCCGGCCGGCAACTGCGTGCACTTCGTGGCCGAGGAGCAGGACTGATTTTGTTACATTGACTTCAAGGAGTCGAGGAATCGATACTGCCGTGTTTTCCA GGATCCGAGGTTTCTATAGACTCTCTATAGACTCTGTAACTAATAGAATCAGACATACCTCTCTGCTATTTGTTTTATGAATTTGGCTTTTGCTCTCTAGTCAGATTGAATGTTATTTCCGCCAGGTGTGTTAGTCGGGCTCT CGTTTGAGTTACAAGAGGGATTGAGTGGCGAGGATTCACTCTAATGTAAATATGACTGTGAACAAAACCTTAAAATTACTACGCATCTTCTTTGACTGTCAGATATTCGTGGTGACAGCAGTCAATGCCTGCAAAATGTCTCTCTGG GTCGCAATTTGGTTTTGGATTGACCTGGTATGCATTATGAAGAAAAAATTCGTATTAGCCAATGCGCTAGCGTGCAATTGCATGGTAGACCTCTTGACGACTGTGAGCTACATCCTTCTGCAACAAGCTGCAATCCCTGCGA TAGACCTTTTCCAACTCAGCAGTCCAAGAAAAACAAGGGGTGAGAAGTATACGCACCTTTCGGTTTCGGCATAATTCTTAAACTCTTGTTGGTCACTTCTTGTTGAAGAAGTAGGGGCACTCGTTTTCCCTCAGAGCCTGCAAA CACAAAATTCCTGCAGTCAATTGTCCCAACACTCGCAAGCGTATTGCGCAAGCAACGATGCGCAAGGCGCTGGATGGATGGCGACTCGCATATGGCTTCTGGGTCCGCAAGTGTGGTATGTCCGGCCTATGTCAATACGCGA ATTCCGACGACTGGCATCTCTAGGAGGAGGATTCTTCTTTTATGACATGTTATTTTATATACATTGATGCTTCCGACAGTCGGAAGTAATAAATGAATTTATTTCAGACTACCTATACTCCTTGACTTGTTGCGACTAATCTTACCG CTTACTAAAATCTGAAATCAGCTTGACCTCTCGCACGCAAAATTTTGCTGCTGGACGCTACGCACTCGGCCAATTCTTCTCGTCTCTGCTGCGCAATTGTGTTGCGTTGATCTTGACCGAAGGAATCAGAGAATAGAATAC CATGAACCACCTGCGTGCCGAAGGACCCGCTCCGTCTCGCCATTGGAACCGCCAACCCGAAAAACATTCTCTCCAAGACGAATCCCTGACTACTACTTCCGCGTGACTAAGAGTGAGCAGATGACGCAATTGAAAGAAAAGT TCCGTAAGATCTGTGATAAGTCCATGATCCGTAAGCGTAACCTGTTTCTGAATGAGGAACACCTTAAGCAGAACCCCCGCTTGGTTCGAACATGAAATGCAGACCTTGGATGCCCGCCAGGACATGCTCGTCTGGAAGTCCCTAAGT TGGGTAAGAGCGCTTGGCCAAGGCCATTAAGGAATGGGGACAGCCCAAGAGTAAGATACCCATTGATTTTACATCCGCTCTACGACCGATATGCCTGGAGCCGATTACCACTGCGCCAAGCTTCTGGGACTGTCCCTCTCC GTTAAGCGCGTCATGATGTACCAGCTTGGATGTTACGGAGGTGCGACCGTCTCTCGTATTGCCAAGGACATTGCCGAAAAACAAGGGTGCCCGTCTCTCGCCGTCTGCTGCGACATCATGGCTCTTCCGCGGACCTC CGAATCCGACTTGGAACTCTCTGTTGGGACAGGCCATTTTGGTGACGGCGCCGCGCGCTCATTGTGCGAGCTGAACCCGACGAATCCGTGCGAGAAAGGCCCATTTTGAATTGGTCTCCACCGACAGACCATTCTCCGGAAC TCCGAAGGAACCATCGGCGACACATTCGTGAAGCCGGTCTCATCTTTGACTTGACAAGGACGTTCCCATGCTCATTCCAACAACATTGAAAAGTGCTCATTGAAGCCTTACCCCCATTGGAATCTCCGACTGGAATAGTATC TTTTGGATTACCCACCCCGAGGAAAGGCCATCTTGATAAGGTGGAAGAAAAGCTCCACCTCAAGTCCGACAAGTTGCTCGACTCCCGTCAGTCTTGTCGGAACACGGAACATGTCGTCTCCACCGTCTCTTTGTCATGGA TGAATTGCGTAAGCGCTCGCTCGAAGAAGGAAAGTCCACCACCGCGGATGGTTTCAATGGGGCGTTCTCTCGGATTGGACCCGGTCTCACCGTCGAACGTGTCGTGCTCGCTTCTGTCGGATTAGTACCACCATCACACC ACCACTAAAAATTAATTTTCATTAGTTGCAGTCACTCCGCTTTGGTTTCAGGGTAATATAGATCTTCGCTGCATAACCTGCTTCGGGGTCATTATAGCGATTTTTTCGGTATATCCATCCTTTTCGACAGATATACAGGATTTTGC AAAGGGTTCTGTAGACTTTCTTGGTGATCCAACGGCGTCAGCCGGGCAAGGATAGGTGAAGTAGGCCACCCGCGAGCGGGTGTCTCTTCTCACTGTCCCTTATTTCGACCTGGCGGTGCTCAACGGGAATCTTGCTCTGCG AGGCTGGCCGGCTACCGCCGGCGTAACAGATGAGGGCAAGCGGATGGCTGATGAACCAAGCCAACAGGAAGGGACGCCACCTATCAAGGTGTACTGCCTCCAGACGAACGAAGAGCGATTGAGGAAAAGGCGGCGGC GGCCGGCATGAGCCTGTGCGCCTACCTGTGCGCGTCGCGCAAGGGCTACAAAATCAGGGGCGTCTGTGACTATGAGCACGTCCGCGAGCTGGCCGATCAATGGCGACCTGGGGCGCCTGGGCGGCTGCTGAAACTCTGGC TCACCGACGACCCGCGCACGGCGCGTTCCGGTGATGCCACGATCTCGCCCTGCTGGCGAAGATCGAAGAGAAGCAGGACGAGCTTGCCAAGGTCTATGATGGGCGTGGTCCGCCGAGGGCAGAGCCATGACTTTTTAGCCG CTAAAACGGCCGGGGGGTGCGCGTGATTGCCAAGCACGTCCCCATGCGCTCCATCAAGAAGAGGCACTTCGAGCTGTAAGTACATCACCGACGAGCAAGGCAAGACGATCCGCGCTGTTTTATTGAGAAGCTTGTCTGTGTTG GCCTCAATGGTAGCGATGCGTCATTACGCGAAGTTCTGGTGCTGATGATGTGGTTCTGCTTTGCCACTGGTCAATGTGTAAGCCCGTGAATGTGAGTAACCTTTTTTACTGATCTCAGTTGAGCACGGCTGATGAGCTTATCCA TGGCCCCACGGTAACGGATATGATCCTTAGGGCGTTGACAAATCTTTGTGCGTTTTCATGGGGTAGACGTGAGTACCAGGGAACGCTCTCCCTACAAAAAGTTGCGCATACTTGTCTCCGTTGTGACGCGCAGGGGTGTCGGAC CAGATTGATCTGTGGCAACGGCCTCATGCGTCAATGGACCTTAAAGCCGGGAAACGAGACTTGAAATGTTTACGTAGAGGTGCATTATAGACCTCACGCGCATATTGAGTGGTTGCAAAAATGTTTTGCAACCGGTATCACTG GAGACCATGCCAGGCAAGGACGGAGGGCATCATAATCATGTTTCAATGCGTTGGACAGCATGCTTGTACACGTAAGTATACGGTCGAGAGCATCGTGACGTTGAGAATTACAGATGGCAACGTGTCGGTGCATGTATTGGCCGAG ATTGTCAAATCGTGCTCAATATATGGCATGCCAGGTAAGTCATGGATGTCGGTATGCCATTACGCTTCATGTCGATTTCGTTGTCGAGAAGTATGATGGGTCCAGTCAACGTGAGAAGTAAGAACACATGGGGAAGGGAATGAA GTTTCATGACTGGTGGTGCGCGCATATCCATGTACGGAAGACCTGTGCTATGTTTAGTGGGATGATGTAATCATCCAGGGTAACAATACGTTGGTTGCCGCCACGGTACGAGACCGATCTTGAACACAATTGTGGCAATGTTCAA GTTGGGCGCTGGAATGGATGGTTTTACCTTACCAAGATGCGCGTATTGATGATGATAACAACATGGGCCCTCGTTGCGATTGACAAAGACCGGACGCCGTGACAATGTCTAGATTGGACAAGGTATGTTTATTATACCGGTTA

TGTGGCTGAACGTCAGTTTTGTGCAGTACGGTAACATCACTCCCCGAAGTCCACCGTTGGCACCGCGATCGACAAGTGCAGATGTGGTATTTGTACTGTGTGTCGGGAGACTTGGTACTGTAACACATTTGACTGAAGTGACT TGGTGGTACCATGAGGACGGAGGAACCCGTTGATACGGTGTTCGCTGACGCTGCAAGTACCTTACGTATGTCGCTGGATCCATACGTCCAACCCGATCAGAAAGATGTGCTAGGAGTTCGGTTTCTGGTGCACAATCATGAAAG GTATCCACGGGAGTTCCATTGTTGTCGTCGGGGCTGCGTCGCGACTGCCAGTTGCATGTACATGCGCCATCAAGGGACGTGCCAATCCATTACTAACCGGGAGAACCTTAGCTGGGGCAGCCAATCCCTGAAGTATAGCCTTAGC ATCATCTGAGAGCTGGTCCACATATCTTAGGGATATAAGGTCGTTACACGGT TAGTGGGCGTACTATGATGTCGGTTATTAGTACAATTTCCCTGCGGGCATGCGCATTGGCTTCATAGAGTACGGAAGGTGACAAGTCAATATTGT AGTTAACATCCGGATCAGTGTCAAAGTCTGTAGGATGGTAAGAAAGATCAGTAGAATGAATACTACGCTTTTCCTTGGGACTACGGGAATTAGAGAAGTTGTTTCCTTTATTGTAGAGTGACGCTGAAGCAAGTAGAAGACTAAGG TAACCTCTGCTAGCTAATAGGATTACCTCCTTTGGCTAGGTCAAGAGTGGCTGTGATCTTCACTTGACAAAGTTCGGGTACATTGTGGACAGCATTCTCCAAAAGACTAAGACACAGTTGCTTTGGGAGTTGCTCAGCCATTGGTACA GTATTGTGGTAGATACAAAGGTGGTCTTCCAATGAAGGATAAATCCTTCTGCTGTGCTGTCCATGAGGATCCATATTCGCCGTAGTTAGGTAAACCAAGCGTGGTGGCTGAACGATCTTCGCACTTGCTGATTCCGTATAGTGT GACAACTTTACAAAACACTTCTTTCGCGAGTTCGCTCTAGCCTGGACAGAGAAGGGACAATCTTCGTCGTTAAGACTCGTGCGCAATAGCAAAAGATCAGAAATAGCACATCGGCACCGACCAACGATTATTTCCAAGGAAAAAA GAATGCTTCACTACAAGAAATTGTGTCATCCCTATACAGAGTCTTGTACTGTGACAGAAAAATTGATGGAAGATGTGGCGGATTGCCTTTACACTAGCCAACCTTGTTCGACTAATTGCAGCTTCTTCTGAGAGGCTTACCGAGTAAC GCGAAGAACACCGGTGTCTCGTACATGCTCGTCGGTGAACGCTCGTCCATGACACCCCCACTTTGTATCAATATCCCACTTGGTAGTGAACGGAATGATACATGCAATTCGCGCCGCATCAACAGCCACGGGCACCATCGAC GAATAGACTCGGTGAGCTGTTGCGCTCGCCGCTGGGCTGCGCGCCGTCTATGGCCCTGCAAAACGCGCCAGAAACGCCGTGCAAGCCGTGTGCGAGACACCGCGGCCGCCGCCGCCGCTGTGGATACCTCGCGGAAAACTT GGCCCTCACTGACAGATGAGGGGCGGACGTTGACACTTGAGGGGCGGACTACCCGCGCGCGGCTTGACAGATGAGGGGCGAGGCTCGATTTTCGCCGCGGACGCTGGAGCTGGCCAGCCTCGCAATCGCGGAAAAACGCGT ATTTTACGCGAGTTTCCACAGATGATGTGGACAAGCCTGGGGATAAGTGCCCTGCGGTATTGACACTTGAGGGGCGGCACTACTGACAGATGAGGGGCGCGATCCTTGACACTTGAGGGGCGAGTGCTGACAGATGAGGGG CGCACCTATTGACATTGAGGGGCTGTCCACAGGCAGAAAAATCCAGCATTGCAAGGGTTTCCGCCGTTTTCGGCCACCGCTAACCTGTCTTTTAACTGCTTTTAAACCAATATTATAAACCTGTTTTTAAACAGGGGCTGCGC CCTGTGCGCGTGACCGCGCACGCCGAAGGGGGTGCCCCCTTCTCGAACCTCCCGGTGCGAGTGAGCGAGGAAGCACCAGGGAACAGCACTTATATATTCTGTTACACACGATGCTGAAAAAATTCCTCTGGGGTTATCC ACTTATCCACGGGGATATTTTATAATTAATTTTTTATAGTTTTAGATCTTCTTTTTAGAGCGCCTTGTAGGCCCTTATCCATGCTGGTTCTAGAGAAAGGTGTGTGACAAATTGCCCTTTCAGTGTGACAAATCACCTCAAATGAC AGTCTGTCTGTGACAAATTGCCCTTAACCTGTGACAAATTGCCCTCAGAAGAAGCTGTTTTTCAAAAGTTATCCCTGCTTATTGACTCTTTTTATTATTAGTGTGACAATCTAAAAAATGTGCACACTTCACATGGATCTGTCTATGG CGGAAACAGCGGTTATCAATCACAAGAAACGTAATAATAGCCCGGAATCGTCCAGTCAAACGACCTCACTGAGGCGGCATAGTCTCTCCCGGATCAAAAACGTATGCTGTATCTGTTGCGTTGACCAGATCAGAAAAATCTGATG GCACCCCTACAGGAAACATGACGGTATCTGCGAGATCCATGTTGCTAAATATGCTGAAATATTGCGATTGACCTCTGCGGAAGCCAGTAAGGATATACGGCAGGCATTGAAGAGTTTCGCGGGGAAGGAAGTGTTTTTATCGCCCT GAAGAGGATGCCGCGATGAAAAAGGCTATGAATCTTTTCTTGGTTTATCAAACGTGCGCACAGTCCATCCAGAGGGCTTTACAGTGTACATATCAACCCATATCTCATTCCCTCTTTATCGGGTTACAGAACCAGGTTTACGCAGT TTCGGCTTAGTGAACAAAAAGAAATACCAATCCGTATGCCATGCGTTTATACGAATCCCTGTGTCAGTATCGTAAGCCGATGGCTCAGGCATGCTCTCTGAAAAATCGACTGGATCATAGAGCGTTACAGCTGCCTCAAAGTTA CCAGCGTATGCGCTGACTTCCGCCGCCGCTTCTGCAAGTCTGTGTTAATGAGATCAACAGCAGAACTCCAATGCGCCTCTCATACATTGAGAAAAAGAAAGGCCGCCAGACGACTCATATCGTATTTCCCTCCCGGATATCACTTCC ATGACGACAGGATAGTCTGAGGGTTATCTGTACAGATTTGAGGGTGGTTCGTACATTTGTTCTGACCTACTGAGGGTAATTTGTACAGTTTTGCTGTTTCTTCAGCCTGCATGGATTTTCTCATACTTTTGAAGTGAATTTTT AAGGAAGCCAAATTTGAGGGCAGTTTGTACAGTTGATTTCTCTCTTTCCCTTCTCATGTGACCTGATATCGGGGTTAGTTCTGTCATATTGATGAGGGTTGATTATCACAGTTTATTACTCTGAATGGCTATCCGGTGTTA CCTCTACCTGGAGTTTTTCCACGGTGATATTTCTTCTGCGCTGAGCTAAGAGCTATCTGACAGAACAGTTCTTCTTGCTCTCGCCAGTTGCTGCTGCTCGGTTACAGCTGCGGCTGCGGCGAGCATCACGTGCTATAAAAA TAATTATAATTTAAATTTTTAATATAAATATATAAATAAAAATAGAAAGTAAAAAAGAAATAAAGAAAAAATAGTTTTTGTTTTCCGAAGATGTAAAGACTCTAGGGGGATCGCCAACAAATACTACCTTTACCTTGCTCTTCT GCTCTCAGGTATTAATGCCGAATTTGTTTCATCTGTCTGTGTAGAAGACCACACAGAAATCCTGTGATTTTACATTTTACTTATCGTTAATCGAATGTATATCTATTAAATCTGCTTTTCTGTCTAATAAATATATGTAAAGTACGCTT TTTGTGAAATTTTTTAAACCTTTGTTATTTTTTTTCTTCTATTCCGTAACCTTCTACCTTCTTTATTACTTTCTAAATCCAATACAAAACATAAAAAATAAATAACACAGAGTAAATCCCAAATATTCCATCATTAAGATACG AGGCGCGTGTAAGTTACAGGCAAGCGATCTAGTACACTCTATATTTTTTATGCCCTCGGTAATGATTTTCATTTTTTTTCCACCTAGCGGATGACTCTTTTTTTTCTTAGCGATTGGCATTATCACATAATGAATTATACATTATATAA AGTAATGTGATTTCTCGAAGAATATACTAAAAAATGAGCAGGCAAGATAAACGAAAGCAAGATGACAGAGCAGAAAGCCCTAGTAAAGCGTATTACAAATGAAACCAAGATTAGATTGCGATCTCTTTAAAGGGTGGTCCCT AGCGATAGAGCACTCGATCTTCCAGAAAAAGAGGCAGAGCAGTAGCAGAACAGGCCACACAATCGCAAGTGATTAACGTCCACACAGGTATAGGGTTTCTGGACCATATGATACATGCTCTGGCCAAGCATTCCGGCTGGTCG CTAATCGTTGAGTGATTTGGTGAATTTACACATAGACGACCATCACACCACTGAAGACTGCGGGATTGCTCTCGGTCAAGCTTTTAAAGAGGCCCTAGGGGCCGTGCGTGGAGTAAAAAGGTTTGGATCAGGATTTGCGCCTTTGG ATGAGGCATTTCCAGAGCGGTGGTAGATCTTTGAAACAGGCCGTACGCAGTTTGTGAACTTGGTTTGAAAGGGAGAAAGTAGGAGATCTCTTTCGAGATGATCCCGCATTTCTTGAAGGCTTTCGAGAGGCTAGCAGAAAT TACCCTCCACGTTGATTGCTGCGAGGCAAGATGATCATCACCGTAGTGAGAGTGCCTTCAAGGCTCTTGGCGTTGCCATAAGAGAAGCCACCTCGCCCAATGGTACCAACGATGTTCCCTCCACCAAGGTTGTTCTTATGATGTT TTACACAGGAGTCTGGACTTGACGCTAGTGATAAAGTGACTGAGGTATGTGCTCTTCTATCTCTTTGATGTTGCTCTTATTAAACAACCTTTCGGTTTGTGATGCTTTGCGATTTGTTGTTGCTTTGCGATTAATGCT AAGATTTAGTAATAAAACGCAAGCAATGATTAAAGGATGTTCAAGATGAACCTATCGGAACAGCTGGTATGCTGCTGATGCTGATTGTTCCACGCGCTGCTGAGTTGTTGACTACACCTCCGCACTGCAGTTGTTTCG GGAAAAATAACCGCGCTGGAGAATAGGTGAAGCAGCGGATTTAGTTGGGGTTTCTTCTCAGGCTATCAGAGATGCCGAGAAAGCAGGGCGACTACCGCACCCGGATGGAAATTCGAGGACGGGTTGAGCAACGTGTTGGT 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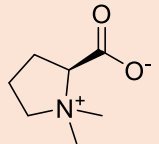
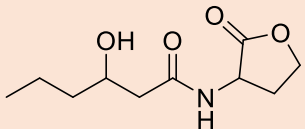
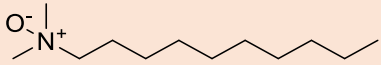
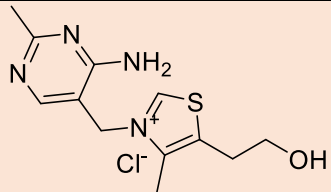
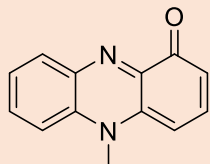
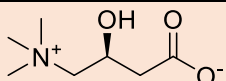
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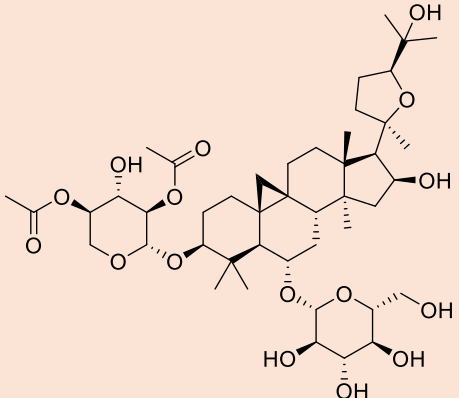
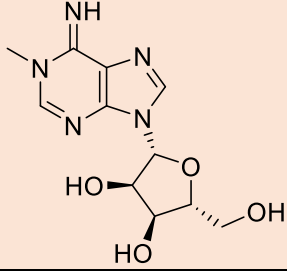
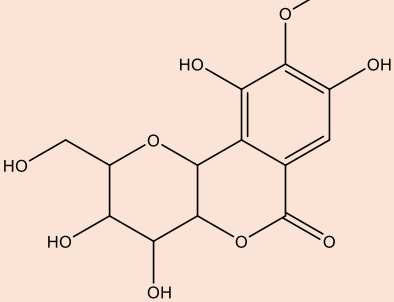
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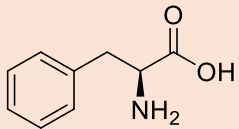
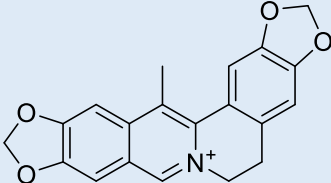
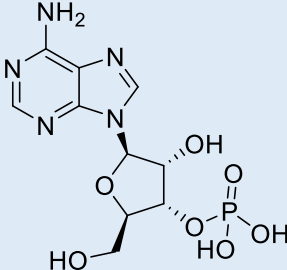
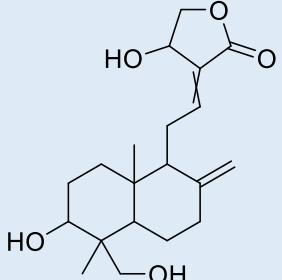
Supplementary Table 2: All primers sequences used in this study.

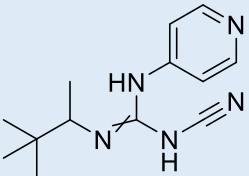
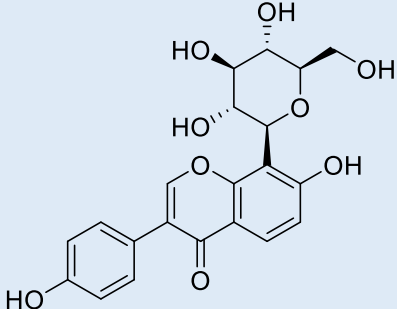
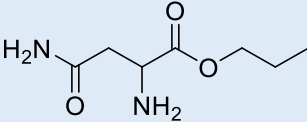
Identity	Sequence
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OAC R	AACAAAATTAGAGGTCTTCT
TKS-F	ATGAACCACCTGCGTGCCGA
TKS-R	GTACTTAATCGGGACGGAGCGAACAACA

Supplementary Table 3: Annotated analytes deregulated in transconjugants. The presence of the heterologous *CsTKS* in *Phaeodactylum tricornutum*'s metabolism displays variations in the activity of the shikimate pathway, the nucleotide metabolism, and amino acids metabolism. Compounds in pink-orange are all upregulated while compounds in blue are deregulated. They are displayed in order of fold change from top to bottom. Biosynthesis / metabolic route section focuses on the common compounds or pathways between all analytes' biosynthesis possible routes.

Analyte	Chemical 2D structure	Compound Family	Biosynthetic Route
Proline Betaine		Dipeptide, quaternary ammonium amino acid	Pyruvate, glutamate, choline oxidation [1, 2]
3-hydroxy-C6-homoserine lactone		Acyl-homoserine-lactone (AHL)	AHL synthase on S-Adenosyl-Methionine [3]
Decyl dimethyl amine oxide		Amine oxide	Unelucidated
Thiamine		Vitamin/cofactor	Pyruvate and purine metabolism [1, 4]
Pyocyanine		Phenazine, pigment	Chorismate, pyruvate [5]
D-Carnitine		Quarternary ammonium amino acid	Trimethyllysine, pathway. Fatty acid metabolism [6, 7]

Isoastragaloside IV		Triterpenoid, saponin	Mevalonate (MVA) and methyerythriol phosphate (MEP) pathways [8, 9]
1-methyladenosine		Purine	Purine metabolism [1]
Bergenin		Lactone, isocoumarin	Shikimate pathway [9]

Phenylalanine		Amino acid	Shikimate pathway [1]
Worenine**		Isoquinoline	Unelucidated
Adenosine 3'-monophosphate		Purine	Purine metabolism [1]
Andrographolide		Diterpenoid	Mevalonate pathway [10]

Pinacidil		N-cyanoguanidine	Unelucidated
Puerarin (Isoflavonoid C-glycoside)		Isoflavonoid	L-phenylalanine [11]
Asparagine propyl ester		Modified amino acid	Unelucidated

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