

Supplementary Material

Increasing protein production by directed vector backbone evolution

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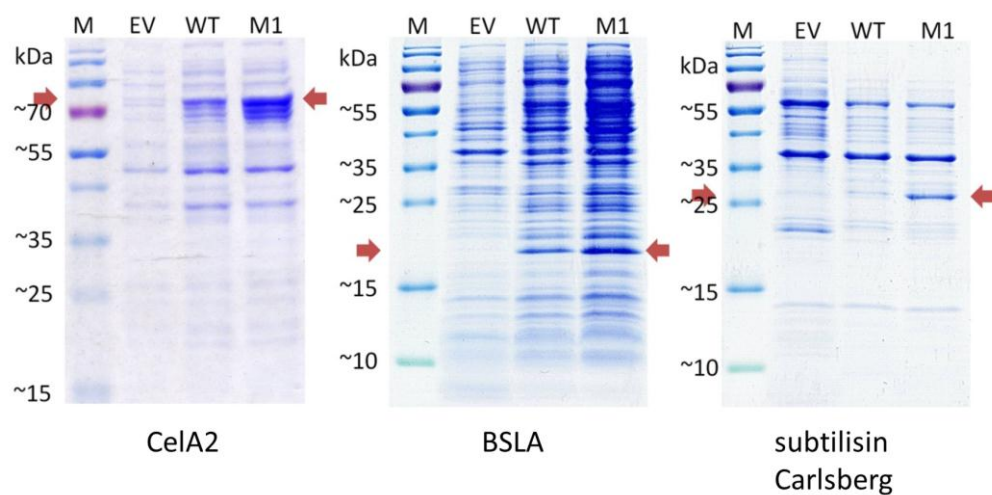
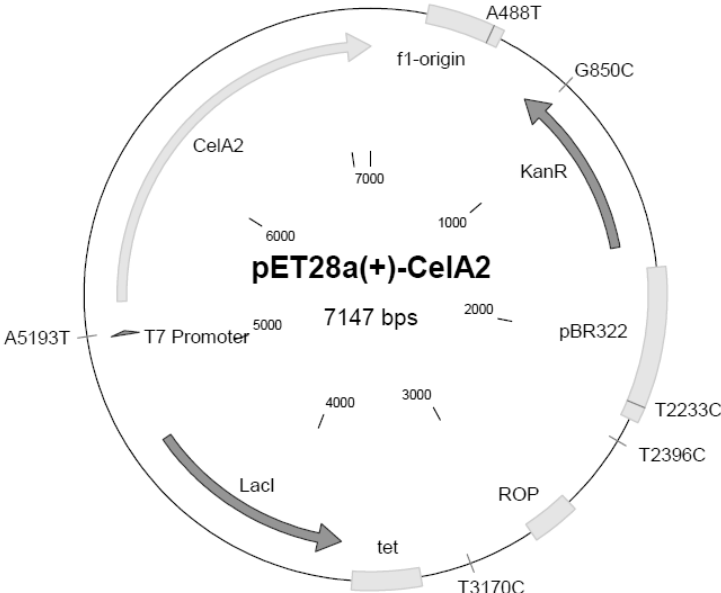


Figure S1: SDS-PAGE of produced cellulase (CelA2), lipase (BSLA) and protease (subtilisin Carlsberg). EV: empty vector control; WT: non-optimized vector constructs; M1: epMEGAWHOP optimized vector constructs. Red arrows indicate the bands of target proteins.

Figure S2: Sequencing results: Alignments of all three vector systems compared to the corresponding 'parents':

pET28a(+)-CelA2 & pET28a(+)-M1-CelA2



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pET28a (+) -CelA2      1 gaattcgagctccgtcgacaagcttgcgggccgactcgagcaccaccaccaccactg
pET28a (+) -M1        1 .....

pET28a (+) -CelA2     61 agatccggctgctaacaaagcccgaaaggaagctgagttggctgctgccaccgctgagca
pET28a (+) -M1       61 .....

pET28a (+) -CelA2    121 ataactagcataacccttggggcctctaaacgggtcttgaggggttttttgcgaaag
pET28a (+) -M1     121 .....

pET28a (+) -CelA2    181 aggaactatatccggattggcgaatgggacgcgccctgtagcggcgcatgaagcggcg
pET28a (+) -M1     181 .....

pET28a (+) -CelA2    241 ggtgtggtggttacgcgcagcgtgaccgctacacttgccagcgccttagcggccgctcct
pET28a (+) -M1     241 .....

pET28a (+) -CelA2    301 ttcgctttcttcccttcccttctcgccacgcttgcggcgtttccccgctcaagctctaaat
pET28a (+) -M1     301 .....

pET28a (+) -CelA2    361 cgggggctcccttaggggtccgatttagtgctttacggcacctcgaccccaaaaactt
pET28a (+) -M1     361 .....

pET28a (+) -CelA2    421 gattagggatgattcagctagtgggccatcgccctgatagacgggttttgcgctttg
pET28a (+) -M1     421 .....

pET28a (+) -CelA2    481 acgttggagtccacgttctttaatagtgactcttgttccaaactggaacaactcaac
pET28a (+) -M1     481 .....t.....

pET28a (+) -CelA2    541 cctatctcgggtctattcttttgatttataagggattttgccgatttcggcctattggtta
pET28a (+) -M1     541 .....

pET28a (+) -CelA2    601 aaaaatgagctgatttaacaaaaatataacgcgaattttaacaaaatattaacgcttaca
pET28a (+) -M1     601 .....

pET28a (+) -CelA2    661 attaggtggcacttttcggggaaatgtgcgcggaaccctatttgtttattttctaaa
pET28a (+) -M1     661 .....

pET28a (+) -CelA2    721 tacattcaaatatgtatccgctcatgaattaattcttagaaaaactcatcgagcatcaa
pET28a (+) -M1     721 .....

pET28a (+) -CelA2    781 tgaaactgcaatttattcatatcaggattatcaataccatattttgaaaagccggttc
pET28a (+) -M1     781 .....

pET28a (+) -CelA2    841 tgtaatgaaggagaaaaactcaccgaggcagttccataggatggcaagatcctggtatcgg
pET28a (+) -M1     841 .....c.....

pET28a (+) -CelA2    901 tctgcatccgactcgtccaacatcaatacaacctattaatttccctcgtcaaaaata
pET28a (+) -M1     901 .....

pET28a (+) -CelA2    961 aggttatcaagtgagaaatcaccatgagtgacgactgaatccggtgagaatggcaaaagt
pET28a (+) -M1     961 .....

pET28a (+) -CelA2   1021 ttatgcatttcttccagacttgttcaacaggccagccattacgctcgtcatcaaaatca
pET28a (+) -M1    1021 .....

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pET28a (+) -CelA2	1081	ctcgcatcaaccaaaccggtatttcattcgtgattgcgctgagcgagacgaaatcgcga
pET28a (+) -M1	1081	.....
pET28a (+) -CelA2	1141	tcgctgtttaaaggacaattacaacacaggaatcgaatgcaaccggcgaggaacactgcc
pET28a (+) -M1	1141	.....
pET28a (+) -CelA2	1201	agcgcatcaacaatattttcacctgaatcaggatattcttctaatacctggaatgctgtt
pET28a (+) -M1	1201	.....
pET28a (+) -CelA2	1261	ttcccggggatcgagtggtgagtaacatgcatcatcaggagtagcgataaaatgcttg
pET28a (+) -M1	1261	.....
pET28a (+) -CelA2	1321	atggtcggaagaggcataaattccgtcagccagtttagtctgaccatctcatctgtaaca
pET28a (+) -M1	1321	.....
pET28a (+) -CelA2	1381	tcattggcaacgctacctttgccatgtttcagaaacaactctggcgcatcgggcttccca
pET28a (+) -M1	1381	.....
pET28a (+) -CelA2	1441	tacaatcgatagattgtcgcacctgattgcccgacattatcgcgagcccatttataccca
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pET28a (+) -CelA2	1501	tataaatcagcatccatggttgaatttaatcgcggcctagagcaagacgtttcccggtga
pET28a (+) -M1	1501
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pET28a (+) -M1	1561
pET28a (+) -CelA2	1621	gacaaaaatcccttaacgtgagttttcgttccactgagcgtcagaccccgtagaaaagat
pET28a (+) -M1	1621	.....
pET28a (+) -CelA2	1681	caaaggatcttcttgagatcctttttctgcgcgtaactctgctgcttgcacacaaaaa
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pET28a (+) -CelA2	1741	accaccgctaccagcgggtgtttgtttgccgatcaagagctaccaactcttttccgaa
pET28a (+) -M1	1741	.....
pET28a (+) -CelA2	1801	ggtaactggcttcagcagagcgcagataccaaatactgtccttctagtgtagccgtagtt
pET28a (+) -M1	1801	.....
pET28a (+) -CelA2	1861	aggccaccacttcaagaactctgtagcaccgcctacatacctcgctctgtaatacctgtt
pET28a (+) -M1	1861	.....
pET28a (+) -CelA2	1921	accagtggctgctgccagtgccgataagtcgtgtcttaccgggttgactcaagacgata
pET28a (+) -M1	1921
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pET28a (+) -M1	2041
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pET28a (+) -M1	2101
pET28a (+) -CelA2	2161	gcgcacgaggagcttccaggggaaacgcctggatctttatagtcctgtcgggttctg
pET28a (+) -M1	2161	.....
pET28a (+) -CelA2	2221	ccacctctgacttgagcgtcgatttttgtgatgctcgtcagggggggcggagcctatggaa
pET28a (+) -M1	2221	.....c.....
pET28a (+) -CelA2	2281	aaacgccagcaacgcggcctttttacggttctctggccttttctggccttttctcacat
pET28a (+) -M1	2281
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pET28a (+) -M1	2341c.....
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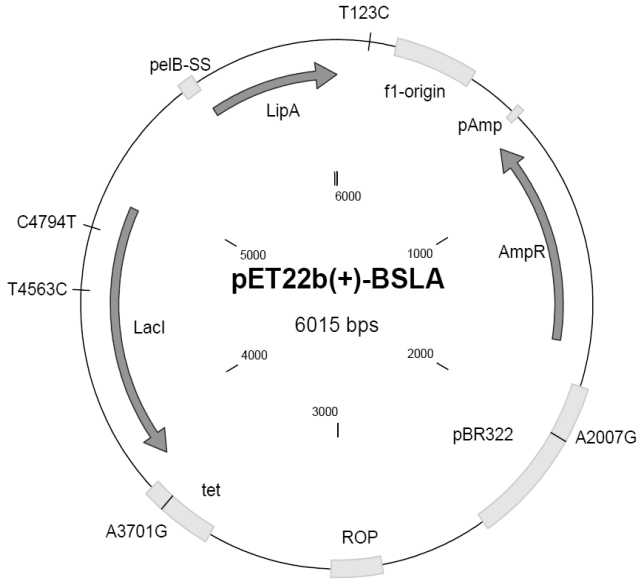
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pET28a (+) -CelA2	2821	TGAGTTTCTCCAGAAGCGTTAATGTCTGGCTTCTGATAAAGCGGGCCATGTTAAGGGCGG
pET28a (+) -M1	2821
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pET28a (+) -M1	4201
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pET28a (+) -CelA2	4561	gacggcgcgtgcagggccagactggaggtggcaacccaatcagcaacgactgtttgcc
pET28a (+) -M1	4561
pET28a (+) -CelA2	4621	gccagttggtgtgccacgcggttgggaatgtaattcagctccgccatcgccgcttccact
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pET28a (+) -CelA2	4801	ctgaattgactctctccggcgctatcatgccataccgcgaaagggttttgcgccattcg
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pET28a (+) -CelA2	4981	gcccacagctccccggccacggggcctgccaccatacccacgccgaaacaagcgtcat
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pET28a (+) -CelA2	5041	gagccccgaagtggcgagcccgatcttcccctcggtgatgtcggcgataataggcgcagc
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pET28a (+) -CelA2	5101	aaccgcacctgtggcgcggtgatgccggccacgatgcgtccggcgtagaggatcgagat
pET28a (+) -M1	5101
pET28a (+) -CelA2	5161	ctcgatcccgcgaaattaatacgcactcactataggggaattgtgagcggataacaattcc
pET28a (+) -M1	5161t.....

pET28a (+) -CelA2	5221	cctctagaaataatTTTgTTTaaCTTTaagaaggagatataccatgggtagcagccatca
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pET28a (+) -CelA2	5341	atggcagacctatgaaaaagaattaccatgatgtatgaagatgataccctggcagcgtt
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pET28a (+) -CelA2	5701	ccgtgcagcagatTTTaccagctTtgactataatggcaattattatgtgaaagTgcgcaa
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pET28a (+) -CelA2	6121	actggaatggatgctgaaaatgcagaatccggaaaccggTggTgTttatcataaagTtac
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pET28a (+) -CelA2	6181	cgcaaaagatcatgcaccgatgaccattctgccgatgaagataaaagTccgctgtatct
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pET28a (+) -CelA2	6241	gagTccggTtagcgcacaggcaacaggtgatTTTgcagcagTtatggcctatgcatatcg
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pET28a (+) -CelA2	6301	catgtataaagatattgatgaagaattTgccaatcagTgtctggatgcagcaatTTTgC
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pET28a (+) -CelA2	6421	caccggcacctataatgatgttagcgcaaccgatgaacgTtattgggcagcagcagaact
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pET28a (+) -CelA2	6481	gtataaaaccaccggTgatgaaaaatatctgaaatataTggaagataattatctgccgaa
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pET28a (+) -CelA2	6541	accgggTTTTggTggTgaaatgggtagctatgcacatgTtgcaattctgaccaatcc
pET28a (+) -M1	6541

pET28a (+) -CelA2	6601	gctgattgaagaagataccgaactgtatcagaaaacccaaaaatgcctttattaataatgc
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pET28a (+) -CelA2	6661	ccagagcattctgaaaatttgggaaaaagatggctataaagtggccctggattattatgt
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pET28a (+) -CelA2	6721	ttggggcagcaataaagatctggcagatcgtgcaatgatgctgatttttgccgatgat
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pET28a (+) -CelA2	6841	caatgccaatgatatttcttatgttaccgccttggcgaaaaagcgcacagaatccgca
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pET28a (+) -CelA2	7081	ttggaatagtcgctggcctatgttctgggttatgtttatagcctgaataccgtggccga
pET28a (+) -M1	7081
pET28a (+) -CelA2	7141	ataataa
pET28a (+) -M1	7141

pET22b(+)-BSLA & pET22b(+)-M1-BSLA



pET22b (+)-BSLA	1	tgagagctccgctcgacaagcttgccggccgactcgagcaccaccaccaccactgaga
pet22b (+)-M1	1	.....
pET22b (+)-BSLA	61	tccggctgctaacaagcccgaaggaagctgagttggctgctgccaccgctgagcaata
pet22b (+)-M1	61	.....
pET22b (+)-BSLA	121	actagcataacccttggggcctctaaacgggtcttgaggggtttttgctgaaggagg
pet22b (+)-M1	121	..c.....
pET22b (+)-BSLA	181	aactatatccggattggcgaatgggacgcgcctgtagcggcgcatlaagcggcgggt
pet22b (+)-M1	181	.....
pET22b (+)-BSLA	241	gtggtggttacgcgcagcgtgaccgctacacttgccagcgccttagcggccgctccttc
pet22b (+)-M1	241	.....
pET22b (+)-BSLA	301	gctttcttcccttctttctcgccacgttcgcccggctttcccgcgtaagctctaaatcgg
pet22b (+)-M1	301	.....
pET22b (+)-BSLA	361	gggctccctttagggttccgatttagtgctttacggcacctcgacccccaaaaacttgat
pet22b (+)-M1	361	.....
pET22b (+)-BSLA	421	tagggatgatggttcacgtagtgggccatcgccctgatagacgggttttcgcccttgacg
pet22b (+)-M1	421	.....
pET22b (+)-BSLA	481	ttggagtcacagttctttaatagtgactcttggttccaaactggaacaacactcaaccct
pet22b (+)-M1	481	.....
pET22b (+)-BSLA	541	atctcggctctattcttttgattataagggattttgcccatttcggcctattggttaaaa
pet22b (+)-M1	541	.....
pET22b (+)-BSLA	601	aatgagctgatttaacaaaaattaacgcgaattttaacaaaatattaacgcttacaatt
pet22b (+)-M1	601	.....
pET22b (+)-BSLA	661	taggtggcacttttcgggaaatgtgcccgaaccctatttggttatttttctaaatac
pet22b (+)-M1	661	.....
pET22b (+)-BSLA	721	attcaaatatgtatccgctcatgagacaataaccctgataaatgcttcaataatattgaa
pet22b (+)-M1	721	.....
pET22b (+)-BSLA	781	aaaggaagatgatgagtattcaacatttccgtgctgcccttattccctttttgcccgc
pet22b (+)-M1	781	.....
pET22b (+)-BSLA	841	tttgccttctggtttttgctcaccagaaacgctggtgaaagtaaagatgctgaagatc
pet22b (+)-M1	841	.....
pET22b (+)-BSLA	901	agttgggtgcacgagtggttacatcgaactggatctcaacagcggtaagatccttgaga
pet22b (+)-M1	901	.....
pET22b (+)-BSLA	961	gttttcgccccgaagaacgttttccaatgatgagcacttttaaagttctgctatgtggcg
pet22b (+)-M1	961	.....
pET22b (+)-BSLA	1021	cggattatcccgctattgacgccgggcaagagcaactcggctgcccatacactattctc
pet22b (+)-M1	1021	.....

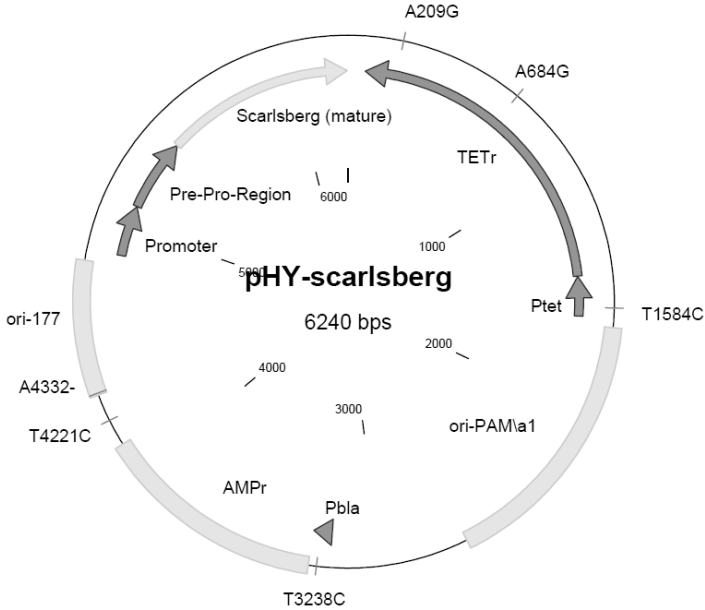
pET22b (+)-BSLA pet22b (+)-M1	1081	agaatgacttggttgagtactcaccagtcacagaaaagcatcttacggatggcatgacag	1081	.....
pET22b (+)-BSLA pet22b (+)-M1	1141	taagagaattatgcagtgctgccataaccatgagtgataaactcgggccaacttacttc	1141	.....
pET22b (+)-BSLA pet22b (+)-M1	1201	tgacaacgatcggaggaccgaaggagctaaccgcttttttgcaacatgggggatcatg	1201	.....
pET22b (+)-BSLA pet22b (+)-M1	1261	taactcgccttgatcgttggaaccggagctgaatgaagccataccaaacgacgagcgtg	1261	.....
pET22b (+)-BSLA pet22b (+)-M1	1321	acaccacgatgcctgcagcaatggcaacaacgttgcgcaaactattaactggcgaactac	1321	.....
pET22b (+)-BSLA pet22b (+)-M1	1381	ttactctagcttcccggcaacaattaatagactggatggaggcgataaagttgcaggac	1381	.....
pET22b (+)-BSLA pet22b (+)-M1	1441	cacttctgcgctcggccctccggctggctggtttattgctgataaatctggagccggtg	1441	.....
pET22b (+)-BSLA pet22b (+)-M1	1501	agcgtgggtctcgcggtatcattgcagcactggggccagatggtaagccctcccgtatcg	1501	.....
pET22b (+)-BSLA pet22b (+)-M1	1561	tagttatctacacgacggggagtcaggcaactatggatgaacgaaatagacagatcgctg	1561	.....
pET22b (+)-BSLA pet22b (+)-M1	1621	agataggtgcctcactgattaagcattggttaactgtcagaccaagtttactcatatatac	1621	.....
pET22b (+)-BSLA pet22b (+)-M1	1681	tttagattgatttaaaacttcatttttaatttaaaaggatctaggtgaagatcctttttg	1681	.....
pET22b (+)-BSLA pet22b (+)-M1	1741	ataatctcatgacaaaaatcccttaacgtgagttttcgttccactgagcgtcagaccccg	1741	.....
pET22b (+)-BSLA pet22b (+)-M1	1801	tagaaaagatcaaaggatcttcttgagatccttttttctgcgcgtaactctgctgcttg	1801	.....
pET22b (+)-BSLA pet22b (+)-M1	1861	aaacaaaaaacaccgctaccagcggtggtttggttgccggatcaagagctaccaactc	1861	.....
pET22b (+)-BSLA pet22b (+)-M1	1921	ttttccgaaggtaactggttcagcagagcgcagataccaataactgtccttctagtgt	1921	.....
pET22b (+)-BSLA pet22b (+)-M1	1981	agccgtagttaggccaccacttcaagaactctgtagcaccgcctacatacctcgcctctgc	1981	.....g.....
pET22b (+)-BSLA pet22b (+)-M1	2041	taatcctggtaccagtggtgctgccagtggcgataagtcgtgtcttacgggttgact	2041	.....
pET22b (+)-BSLA pet22b (+)-M1	2101	caagacgatagttaccggataaggcgcagcggtcgggtgaacgggggttcgtgcacac	2101	.....
pET22b (+)-BSLA pet22b (+)-M1	2161	agcccagcttgagcgaacgacctacacogaactgagatacctacagcgtgagctatgag	2161	.....
pET22b (+)-BSLA pet22b (+)-M1	2221	aaagcggcagcttcccgaaggagaaaggcggacaggtatccggtgaacggcagggtcg	2221	.....
pET22b (+)-BSLA pet22b (+)-M1	2281	gaacaggagagcgcacgaggagcttccaggggaaacgcctggtatctttatagtctcg	2281	.....
pET22b (+)-BSLA pet22b (+)-M1	2341	tcgggttcgccacctctgacttgagcgtcgatttttgtgatgctcgtcagggggcgga	2341	.....
pET22b (+)-BSLA pet22b (+)-M1	2401	gcctatggaaaaacgccagcaacgcggcctttttacggttcctggccttttgcctg	2401	.....

pET22b (+)-BSLA pet22b (+)-M1	2461	ttgctcacatggtcttttctgcttatcccctgattctgtggataaccgtattaccgct
	2461	.....
pET22b (+)-BSLA pet22b (+)-M1	2521	ttgagtgagctgataccgctcgccgcagccgaacgaccgagcgcagcagctcagtgagcg
	2521	.....
pET22b (+)-BSLA pet22b (+)-M1	2581	aggaagcgggaagagcgcctgatgcggtatTTTTCTCCTTACGCATCTGTGCGGTATTTTCA
	2581	.....
pET22b (+)-BSLA pet22b (+)-M1	2641	accgcaatggtgcactctcagtacaatctgctctgatgccgcatagttaagccagtatac
	2641	.....
pET22b (+)-BSLA pet22b (+)-M1	2701	actccgctatcgctacgtgactgggtcatggctgccccgaccccccaacaccgct
	2701	.....
pET22b (+)-BSLA pet22b (+)-M1	2761	gacgcccctgacgggcttctgctcctccggcatccgcttacagacaagctgtgaccgtc
	2761	.....
pET22b (+)-BSLA pet22b (+)-M1	2821	tccgggagctgcatgtgtcagaggttttaccgctcatcaccgaaacgcgcgaggcagctg
	2821	.....
pET22b (+)-BSLA pet22b (+)-M1	2881	cggtaaagctcatcagcgtggtcgtgaagcgattcacagatgtctgcctgttcatccgcg
	2881	.....
pET22b (+)-BSLA pet22b (+)-M1	2941	tccagctcgttgagtttctccagaagcgttaatgtctggcttctgataaagcgggcatg
	2941	.....
pET22b (+)-BSLA pet22b (+)-M1	3001	ttaagggcggTTTTCTGTTGGTCACTGATGCCTCCGTGTAAGGGGATTTCTGTTT
	3001	.....
pET22b (+)-BSLA pet22b (+)-M1	3061	atgggggtaatgataccgatgaaacgagagaggatgctcacgatacgggttactgatgat
	3061	.....
pET22b (+)-BSLA pet22b (+)-M1	3121	gaacatgcccggttactggaacgttgtgagggtaacaactggcggatggatgcggcgg
	3121	.....
pET22b (+)-BSLA pet22b (+)-M1	3181	gaccagagaaaaatcactcagggcctcaatgccagcgttctgtaatacagatgtaggtgtt
	3181	.....
pET22b (+)-BSLA pet22b (+)-M1	3241	ccacagggtagccagcagcatcctgcgatgcagatccggaacataatggtgcagggcgct
	3241	.....
pET22b (+)-BSLA pet22b (+)-M1	3301	gacttccgctttccagactttacgaaacacgaaaccgaagaccattcatgttgttgc
	3301	.....
pET22b (+)-BSLA pet22b (+)-M1	3361	caggtcgcagacgttttgcagcagcagctcgttccgctcgcgtatcggtgattca
	3361	.....
pET22b (+)-BSLA pet22b (+)-M1	3421	ttctgtaaccagtaaggcaaccccgccagcctagccggctcctcaacgacaggagcagc
	3421	.....
pET22b (+)-BSLA pet22b (+)-M1	3481	atcatgcgcacccgtggggccgcatgccggcgataatggcctgcttctcgccgaaacgt
	3481	.....
pET22b (+)-BSLA pet22b (+)-M1	3541	ttggtggcgggaccagtgacgaaggcttgagcagggcgtgcaagattccgaataaccgca
	3541	.....
pET22b (+)-BSLA pet22b (+)-M1	3601	agcgacaggccgatcatcgtcgcgtccagcgaagcggctcctcgccgaaaatgaccag
	3601	.....
pET22b (+)-BSLA pet22b (+)-M1	3661	agcgtcgcggcacctgtcctacgagttgcatgataaagaagacagtcataagtgcggcg
	3661	.....g.....
pET22b (+)-BSLA pet22b (+)-M1	3721	acgatagtcatgccccgcgccaccggaaggagctgactgggttgaagctctcaagggc
	3721	.....
pET22b (+)-BSLA pet22b (+)-M1	3781	atcggctcgagatcccggctcctaataatgagtgagctaacttacattaattgcgttcgctca
	3781	.....

pET22b (+)-BSLA pet22b (+)-M1	3841	ctgcccgcgtttccagtcgggaaacctgtcgtgccagctgcattaatgaatcggccaacgc 3841
pET22b (+)-BSLA pet22b (+)-M1	3901	gcggggagagcggtttgctattgggcgccagggtggtttttcttttcaccagtggagc 3901
pET22b (+)-BSLA pet22b (+)-M1	3961	gggcaacagctgattgcccttcaccgcctggccctgagagagttgcagcaagcgggtccac 3961
pET22b (+)-BSLA pet22b (+)-M1	4021	gctggtttgccccagcagcgcaaaatcctggttgatgggtggttaacggcgggataaaca 4021
pET22b (+)-BSLA pet22b (+)-M1	4081	tgagctgtcttcggtatcgtcgtatcccactaccgagatatccgcaccaacgcgcagccc 4081
pET22b (+)-BSLA pet22b (+)-M1	4141	ggactcggtaatggcgcgcattgcgccagcgcctatctgatcgttggcaaccagcatcgc 4141
pET22b (+)-BSLA pet22b (+)-M1	4201	agtgggaacgatgcctcattcagcatttgcattggttggtaaaccggacatggcact 4201
pET22b (+)-BSLA pet22b (+)-M1	4261	ccagtcgccttcccgttccgctatcggctgaatttgattgcgagtgagatatttatgcca 4261
pET22b (+)-BSLA pet22b (+)-M1	4321	gccagccagacgcagacgcgccgagacagaacttaatgggccgcctaacagcgcgatttg 4321
pET22b (+)-BSLA pet22b (+)-M1	4381	ctggtgaccaatgcgaccagatgctccacgccagtcgctaccgtcttcatgggagaa 4381
pET22b (+)-BSLA pet22b (+)-M1	4441	aataaactgttgatgggtgtctggtcagagacatcaagaaataacgccggaacattagt 4441
pET22b (+)-BSLA pet22b (+)-M1	4501	gcaggcagcttccacagcaatggcatcctggtcatccagcggatagttaatgatcagccc 4501
pET22b (+)-BSLA pet22b (+)-M1	4561	actgacgcgttgccgcgagaagattgtgcaccgccgctttacaggcttcgacgccgcttcg 4561 ..c.....
pET22b (+)-BSLA pet22b (+)-M1	4621	ttctaccatcgacaccaccacgcgtggcaccacagttgatcggcgcgagatttaacgcgcc 4621
pET22b (+)-BSLA pet22b (+)-M1	4681	gacaatttgcgacggcgcgtgcagggccagactggagggtggcaacgcaccaatcagcaacga 4681
pET22b (+)-BSLA pet22b (+)-M1	4741	ctggttgcgccagttgtgtgccacgcggttgggaatgtaattcagctccgcacatcgc 4741 .....t.....
pET22b (+)-BSLA pet22b (+)-M1	4801	cgcttccacttttcccgcgttttcgcagaaacgtggctggcctggttcaccacgcggga 4801
pET22b (+)-BSLA pet22b (+)-M1	4861	aacggtctgataagagacaccggcatactctgcgacatcgtataacggttactggtttcac 4861
pET22b (+)-BSLA pet22b (+)-M1	4921	atcaccaccctgaattgactctcttccgggcgctatcatgccataccgcgaaaggtttt 4921
pET22b (+)-BSLA pet22b (+)-M1	4981	gcgccattcgatggtgtccgggatctcgcagcctctcccttatgcgactcctgcattagga 4981
pET22b (+)-BSLA pet22b (+)-M1	5041	agcagcccagtagtaggtgagggcgttgagcaccgcccgccgaaggaatggtgcatgca 5041
pET22b (+)-BSLA pet22b (+)-M1	5101	aggagatggcgcaccaacagtcctccggccacgggctgccaccataaccacgcgcaaac 5101
pET22b (+)-BSLA pet22b (+)-M1	5161	aagcgtcatgagcccgaagtggcgagcccgatcttcccacatcgggtgatgtcggcgatat 5161

pET22b (+) -BSLA	5221	aggcgccagcaaccgcacctgtggcgccggtgatgccggccacgatgcggtccggcgtaga
pet22b (+) -M1	5221	.....
pET22b (+) -BSLA	5281	ggatcgagatctcgatcccgcgaaattaatacgactcactataggggaattgtgagcgga
pet22b (+) -M1	5281	.....
pET22b (+) -BSLA	5341	taacaattcccctctagaaaataattttgtttaactttaagaaggagatatacatatgaaa
pet22b (+) -M1	5341	.....
pET22b (+) -BSLA	5401	tacctgctgccgaccgctgctgctggtctgctgctcctcgctgccagccggcgatggcc
pet22b (+) -M1	5401	.....
pET22b (+) -BSLA	5461	atggatatcgctgaacacaatccagtcgttatggttcacggtattggaggggcatcattc
pet22b (+) -M1	5461	.....
pET22b (+) -BSLA	5521	aattttgcgggaattaagagctatctcgtatctcagggctggctcgggacaagctgtat
pet22b (+) -M1	5521	.....
pET22b (+) -BSLA	5581	gcagttgatttttgggacaagacaggcacaattataacaatggaccggtattatcacga
pet22b (+) -M1	5581	.....
pET22b (+) -BSLA	5641	tttgtcaaaaaggttttagatgaaacgggtgcgaaaaagtggatattgtcgtcacagc
pet22b (+) -M1	5641	.....
pET22b (+) -BSLA	5701	atggggggcgcgcaacacactttactacataaaaaatctggacggcggaataaagttgca
pet22b (+) -M1	5701	.....
pET22b (+) -BSLA	5761	aacgtcgtgacgcttggcgccgcaaccggttgacgacaggcaaggcgcttccgggaaca
pet22b (+) -M1	5761	.....
pET22b (+) -BSLA	5821	gatccaaatcaaaaagattttatacacatccatttacagcagtgccgatatgattgtcatg
pet22b (+) -M1	5821	.....
pET22b (+) -BSLA	5881	aattacttatcaagattagatggtgctagaaaacggttcaaatccatggcggttgacacatc
pet22b (+) -M1	5881	.....
pET22b (+) -BSLA	5941	ggccttctgtacagcagccaagtcaacagcctgattaagaagggtgaacggcgggggc
pet22b (+) -M1	5941	.....
pET22b (+) -BSLA	6001	cagaatacgaattaa
pet22b (+) -M1	6001	.....

pHY-scarlsberg & pHYM1-scarlsberg



pHY-scarlsberg	1	cataccccggaattcctgttataaaaaaggatcaatTTTgaactctctcccaaagttg
pHY M1-scarlsber	1	.....
pHY-scarlsberg	61	atcccttaacgatttagaaatccctttgagaatgTTTatatacattcaaggtaccagcc
pHY M1-scarlsber	61	.....
pHY-scarlsberg	121	aactaatgacaatgattcctgaaaaagtaataacaaattactatacagataagttgact
pHY M1-scarlsber	121	.....
pHY-scarlsberg	181	gatcaacttccataggtacaacctTTTgatcaagtaagggtatggataataaacaccta
pHY M1-scarlsber	181	.....g.....
pHY-scarlsberg	241	caattgcaatacctgttccctctgataaaaagctggtaaagttaagcaaacctattccag
pHY M1-scarlsber	241	.....
pHY-scarlsberg	301	caccagcttctgctgtttcaagctacttgaacaattgTTTgatataactgTTTggtga
pHY M1-scarlsber	301	.....
pHY-scarlsberg	361	acgaaagccacctaatacaaatatcattataattgtcatgaacatgatgTTTtctta
pHY M1-scarlsber	361	.....
pHY-scarlsberg	421	aaagaaaggaagcagttaaaagctaacagaaagaaatgtaactccgatgTTTaacagt
pHY M1-scarlsber	421	.....
pHY-scarlsberg	481	ataaaggaccttctctatcaacaagtatcccaccaatgtagccgaaataatgacactca
pHY M1-scarlsber	481	.....
pHY-scarlsberg	541	ttgttccaggaaaataattacacttccgatttccgagcacttagctggtgaacatctt
pHY M1-scarlsber	541	.....
pHY-scarlsberg	601	tcatcatataaggaacctagagacaaaccctgctactgTTTccaaatataattccccac
pHY M1-scarlsber	601	.....
pHY-scarlsberg	661	aaagaactccaatcataaaaggtatattTTTccctaataccgggatcaacaaaaggatctg
pHY M1-scarlsber	661	.....g.....
pHY-scarlsberg	721	ttactttctgatatgTTTtacaatatcaggaatgacagcacgctaacgataagaaaag
pHY M1-scarlsber	721	.....
pHY-scarlsberg	781	aaatgctatatgatgTTTgtaaacacataaaaaatacaatgcctacagacattagtataa
pHY M1-scarlsber	781	.....
pHY-scarlsberg	841	ttcctttgatatacaaatgacctTTTtacccttcttcttctttaaataatttcataagaa
pHY M1-scarlsber	841	.....
pHY-scarlsberg	901	acggaacagtataattgTTTatcataggaatgagtagaagataggaccaatgaatataat
pHY M1-scarlsber	901	.....
pHY-scarlsberg	961	ggctatcattcccaaatcgctggaccgactccttctcccatggctactatcgatccaa
pHY M1-scarlsber	961	.....
pHY-scarlsberg	1021	taagaccaaagtcttaccctattTTTccttggaaatagcgcgcaactacaaccatta
pHY M1-scarlsber	1021	.....

PHY-scarlsberg	1081	cgagtgtggaatgcagctgcaccagccccttgaataaaaacgagccataataagtaagg
PHY M1-scarlsber	1081	.....
PHY-scarlsberg	1141	aaaagaagaatggccaacaacccaattaccgaccgaaacaatttattataattccaa
PHY M1-scarlsber	1141	.....
PHY-scarlsberg	1201	ataggagtaaccttttgatgcctaattgatcagatagctttccatatacagctgttccaa
PHY M1-scarlsber	1201	.....
PHY-scarlsberg	1261	tggaaaaggttaacataaaggctgtgttcaccagtttgtactcgcaggtggtttattaa
PHY M1-scarlsber	1261	.....
PHY-scarlsberg	1321	aatcatttgcaatatcaggtaatgagacgttcaaaaccatttcatttaatacgtataaaa
PHY M1-scarlsber	1321	.....
PHY-scarlsberg	1381	aagataaaatgcaaagcacaattaaaatttgggtgtgtcgtaaattcgattgtgaatagg
PHY M1-scarlsber	1381	.....
PHY-scarlsberg	1441	atgtattcacatttcaccctccaataatgagggcagacgtagtattatagggtaatagata
PHY M1-scarlsber	1441	.....
PHY-scarlsberg	1501	cgcttccctcttttaattgaacctgttacattcattattcattacacttcataaataat
PHY M1-scarlsber	1501	.....
PHY-scarlsberg	1561	tctcctaaacttgattaaaaca ^T tttaccacataaaactaagttttaaattcagatt
PHY M1-scarlsber	1561	.....^C
PHY-scarlsberg	1621	tcatcacttatacaacaatatggcccgtttgttgaactactctttaataaaataatTTTT
PHY M1-scarlsber	1621	.....
PHY-scarlsberg	1681	cggttccaattccacattgcaataatagaaaatccatcttcacggtttttcgtcatc
PHY M1-scarlsber	1681	.....
PHY-scarlsberg	1741	atctgtatgaatcaaatcgcttcttctgtgtcatcaaggtttaattttttatgtatttc
PHY M1-scarlsber	1741	.....
PHY-scarlsberg	1801	ttttaaaaaccaccatagagattaaccttttacggtgtaaaccttccccaatcaga
PHY M1-scarlsber	1801	.....
PHY-scarlsberg	1861	caaacgtttcaaatcttttcttcatcatcggtcataaaatccgatatcctttacaggata
PHY M1-scarlsber	1861	.....
PHY-scarlsberg	1921	tttgcagtttcgtcaattgccgattgtatccgatttatattttttcgtcgaat
PHY M1-scarlsber	1921	.....
PHY-scarlsberg	1981	catttgaacttttacatttgatcatagtctaatttcattgcctttttccaaaattgaat
PHY M1-scarlsber	1981	.....
PHY-scarlsberg	2041	ccattgtttttgattcacgtagttttctgtattctttaaataagttggttccacacatac
PHY M1-scarlsber	2041	.....
PHY-scarlsberg	2101	caatacatgcatgtgctgattataagaattatctttattttattgtcacttccggtgc
PHY M1-scarlsber	2101	.....
PHY-scarlsberg	2161	acgcataaaaccaacaagatttttattaattttttatattgcatcattcggcgaatcc
PHY M1-scarlsber	2161	.....
PHY-scarlsberg	2221	ttgagccatatctgacaaactcttatttaattcttcgccatcataaacatttttaactgt
PHY M1-scarlsber	2221	.....
PHY-scarlsberg	2281	taatgtgagaaacaaccaacgaactgttggttttgtttaataacttcagcaacaacctt
PHY M1-scarlsber	2281	.....
PHY-scarlsberg	2341	ttgtgactgaatgccatgtttcattgctctcctccagttgcacattggacaaagcctgga
PHY M1-scarlsber	2341	.....
PHY-scarlsberg	2401	tttaaaaaccacactcgatacaactttctttcgcctgtttcacgattttgtttatactc
PHY M1-scarlsber	2401	.....

pHY-scarlsberg 2461 taatatttcagcacaatcttttactctttcagcctttttaattcaagaatatgcagaag
 pHY M1-scarlsber 2461
 pHY-scarlsberg 2521 ttcaaagtaatcaacattagcgattttctttctctccatgggtctcacttttccactttt
 pHY M1-scarlsber 2521
 pHY-scarlsberg 2581 tgtcttgccactaaaacccttgatttttcatctgaataaatgctactattaggacacat
 pHY M1-scarlsber 2581
 pHY-scarlsberg 2641 aatattaaagaagaacccccatctatttagttatttggttggtcacttataactttaacag
 pHY M1-scarlsber 2641
 pHY-scarlsberg 2701 atggggttttctgtgcaaccaattttaagggttttcaatactttaaaacacatacatac
 pHY M1-scarlsber 2701
 pHY-scarlsberg 2761 caacacttcaacgcacctttcagcaactaaaataaaaatgacgttatttctatatgtatc
 pHY M1-scarlsber 2761
 pHY-scarlsberg 2821 aagataagaaagaacaagttcaaaaacctcaaaaaagacaccttttcagggtgctttttt
 pHY M1-scarlsber 2821
 pHY-scarlsberg 2881 tattttataaactcattccctgatctcgacttctgttcttttttacctctcggttatgag
 pHY M1-scarlsber 2881
 pHY-scarlsberg 2941 ttagttcaaattcgttcttttaggttctaaatcggtttttcttgggaattgtgctgttt
 pHY M1-scarlsber 2941
 pHY-scarlsberg 3001 taccctttaccttgctcaaaaacccttaaaaacgtttttaaggcttttaagccgtctg
 pHY M1-scarlsber 3001
 pHY-scarlsberg 3061 tacgttccttaaggaattattccttagtgctttctaggttaatgtcatgataataatggt
 pHY M1-scarlsber 3061
 pHY-scarlsberg 3121 ttcttagacgtcaggtggcacttttcggggaaatgtgcgcggaaccctatttgtttatt
 pHY M1-scarlsber 3121
 pHY-scarlsberg 3181 ttctaaatacattcaaatatgtatccgctcatgagacaataaccctgataaatgctca
 pHY M1-scarlsber 3181
 pHY-scarlsberg 3241 ataatatgaaaaaggaagagtatgagtattcaacatttccgtgtcgccttattccctt
 pHY M1-scarlsber 3241
 pHY-scarlsberg 3301 ttttgcgcattttgccttctgtttttgctcaccagaaaacgctggtgaaagtaaaaga
 pHY M1-scarlsber 3301
 pHY-scarlsberg 3361 tgctgaagatcagttgggtgcacgagtggttacatcgaactggatctcaacagcggtaa
 pHY M1-scarlsber 3361
 pHY-scarlsberg 3421 gatccttgagagtttgcgcccgaagaacgtttccaatgatgagcacttttaagttct
 pHY M1-scarlsber 3421
 pHY-scarlsberg 3481 gctatgtggcgggtattatcccggttgacgcccggcaagagcaactcggtcgccgat
 pHY M1-scarlsber 3481
 pHY-scarlsberg 3541 aactattctcagaatgacttggttgagtactcaccagtcacagaaaagcatcttacgga
 pHY M1-scarlsber 3541
 pHY-scarlsberg 3601 tggcatgacagtaagagaattatgcagtgctgcataaacatgagtgataaacactgcggc
 pHY M1-scarlsber 3601
 pHY-scarlsberg 3661 caacttacttctgacaacgatcggaggaccgaaggagctaacccgtttttgcacaacat
 pHY M1-scarlsber 3661
 pHY-scarlsberg 3721 ggggatcatgtaactcgcttgatcggtgggaaccggagctgaatgaagccataccaaa
 pHY M1-scarlsber 3721
 pHY-scarlsberg 3781 cgacgagcgtgacaccacgatgcctgcagcaatggcaacaacgttgcgcaactattaac
 pHY M1-scarlsber 3781

pHY-scarlsberg	3841	tggcgaactacttactctagcttcccggcaacaattaatagactggatggaggcggataa
pHY M1-scarlsber	3841	.....
pHY-scarlsberg	3901	agttgcaggaccacttctgcgctcgcccttccggctggctggtttattgctgataaatc
pHY M1-scarlsber	3901	.....
pHY-scarlsberg	3961	tggagccggtgagcgtgggtctcgcggtatcattgcagcactggggccagatggtaagcc
pHY M1-scarlsber	3961	.....
pHY-scarlsberg	4021	ctcccgatcgtagttatctacacgacgggagtcaggcaactatggatgaacgaaatag
pHY M1-scarlsber	4021	.....
pHY-scarlsberg	4081	acagatcgctgagatagggtcctcactgattaagcattggtaactgtcagaccaagtta
pHY M1-scarlsber	4081	.....
pHY-scarlsberg	4141	ctcatatatacttttagattgatttaaaacttcatttttaatttaaaaggatctaggtgaa
pHY M1-scarlsber	4141	.....
pHY-scarlsberg	4201	gatcctttttgataatctcatgaccaaatacccttaacgtgagttttcgttccactgagc
pHY M1-scarlsber	4201	.....c.....
pHY-scarlsberg	4261	gtcagacccttaataagatgatcttcttgagatcgttttggctctgcgctaactctcttg
pHY M1-scarlsber	4261	.....
pHY-scarlsberg	4321	ctctgaaaacgaaaaaaccccttgcagggaggtttttcgaaggttctctgagctaccaa
pHY M1-scarlsber	4321	.....
pHY-scarlsberg	4381	ctctttgaaccgaggttaactggcttggaggagcgcagtcaccaaacttgctcttcagt
pHY M1-scarlsber	4380	.....
pHY-scarlsberg	4441	ttagccttaaccggcgcgatgacttcaagactaactcctctaatacaattaccagtggctg
pHY M1-scarlsber	4440	.....
pHY-scarlsberg	4501	ctgccagtgggtgcttttgcatgtcttccgggttgactcaagacgatagttaccggata
pHY M1-scarlsber	4500	.....
pHY-scarlsberg	4561	aggcgcagcggctcggactgaacgggggttcgtgcatacagtcacagcttgagcgaactg
pHY M1-scarlsber	4560	.....
pHY-scarlsberg	4621	cctaccggaaactgagtgctcaggcgtggaatgagacaaacgcccataacagcggaaatg
pHY M1-scarlsber	4620	.....
pHY-scarlsberg	4681	acaccgtaaacgaaaggcaggaacagggagcgcacgagggagccgcccaggggaaac
pHY M1-scarlsber	4680	.....
pHY-scarlsberg	4741	gcctggtatctttatagtcctgtcgggtttcgccaccactgatttgagcgtcagatttcg
pHY M1-scarlsber	4740	.....
pHY-scarlsberg	4801	tgatgctgtcagggggcggagcctatggaaaaacggctttgccaagcttctagagat
pHY M1-scarlsber	4800	.....
pHY-scarlsberg	4861	ctgcaggtcgacggatccgacctcttccctgcaggtgaagcgtctattcatacttt
pHY M1-scarlsber	4860	.....
pHY-scarlsberg	4921	cgaactgaacatTTTTCTAAACAGTTATTAATAACCAAAAATTTAAATTGGTCCTCC
pHY M1-scarlsber	4920	.....
pHY-scarlsberg	4981	AAAAAATAGGCCTACCATATAATTCATTTTTTTCTATAATAAATTAACAGAATAATTG
pHY M1-scarlsber	4980	.....
pHY-scarlsberg	5041	GAATAGATTATATTATCCTTCTATTTAAATTATTCTGAATAAGAGGAGGAGAGTGAGTA
pHY M1-scarlsber	5040	.....
pHY-scarlsberg	5101	ATGATGAGGAAAAAGAGTTTTGGCTTGGGATGCTGACGGCCTTATGCTCGTGTTCACG
pHY M1-scarlsber	5100	.....
pHY-scarlsberg	5161	ATGGCATTCAAGCATTCCGCTTCTGCTGCTCAACCGCGAAAAATGTTGAAAAGGATTAT
pHY M1-scarlsber	5160	.....

pHY-scarlsberg 5221 attgtcggatttaagtcaggagtgaaaaccgcatctgtcaaaaaggacatcatcaaagag
 pHY M1-scarlsber 5220

pHY-scarlsberg 5281 agcggcggaaaagtggaacaagcagtttagaatcatcaacgaggcaaaagcgaagctagac
 pHY M1-scarlsber 5280

pHY-scarlsberg 5341 aaagaagcgccttaaggaagtcaaaaatgatccggatgtcgcttatgtggaagaggatcat
 pHY M1-scarlsber 5340

pHY-scarlsberg 5401 gtggcccatgcgctagcgcgcaaacggcttccttacggcattcctctcattaaagcggacaaa
 pHY M1-scarlsber 5400

pHY-scarlsberg 5461 gtgcaggctcaaggctttaaggagcgaatgtaaaagtagccgctcctggatacaggaatc
 pHY M1-scarlsber 5460

pHY-scarlsberg 5521 caagcttctcatccggacttgaacgtagtcggcggagcaagctttgtggctggcgaagct
 pHY M1-scarlsber 5520

pHY-scarlsberg 5581 tataacaccgacggcaacggacacggcacacatggtgccgtacagtagctgcgcttgac
 pHY M1-scarlsber 5580

pHY-scarlsberg 5641 aatacaacgggtgtattagcggttgcgccaagcgtatccttgtacgggttaaagtactg
 pHY M1-scarlsber 5640

pHY-scarlsberg 5701 aattcaagcgggaagcggatcatacagcggcattgtaagcggaaatcgagtggcgacaaca
 pHY M1-scarlsber 5700

pHY-scarlsberg 5761 aacggcatggatgttatcaatatgagccttgggggagcatcaggctcgacagcagatgaaa
 pHY M1-scarlsber 5760

pHY-scarlsberg 5821 caggcagtcgacaatgcatatgcaagaggggttgcgcttagctgcagcagggaaacagc
 pHY M1-scarlsber 5820

pHY-scarlsberg 5881 ggatcttcaggaaacacgaatacaattggctatcctgcgaaatacgattctgtcatcgct
 pHY M1-scarlsber 5880

pHY-scarlsberg 5941 gttggtcggtagactctaacagcaacagagcttcatcttccagcgtcggagcagagctt
 pHY M1-scarlsber 5940

pHY-scarlsberg 6001 gaagtcagtgctcctggcgcaggcgtatacagcacttacccaacgaacacttatgcaaca
 pHY M1-scarlsber 6000

pHY-scarlsberg 6061 ttgaacggaacgtcaatggcttctcctcatgtagcgggagcagcagcttgatcttgca
 pHY M1-scarlsber 6060

pHY-scarlsberg 6121 aaacatccgaaccttccagcttcacaagtccgcaaccgtctctccagcagcggcacttat
 pHY M1-scarlsber 6120

pHY-scarlsberg 6181 ttgggaagctccttctactatgggaaaggctctgatcaatgtcgaagctgccgctcaataa
 pHY M1-scarlsber 6180