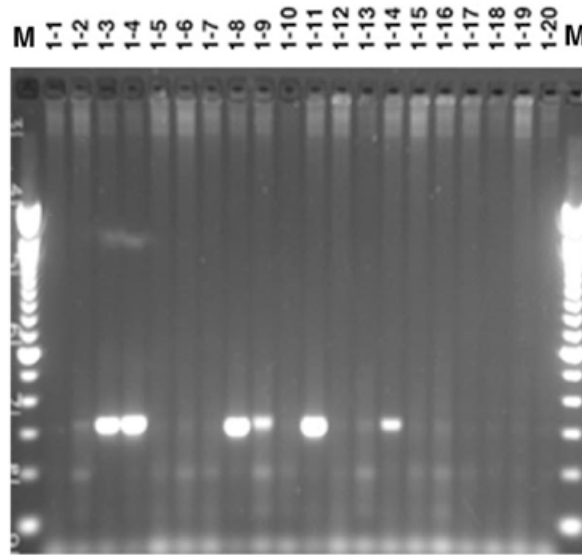


SUPPLEMENTARY MATERIAL

A



B

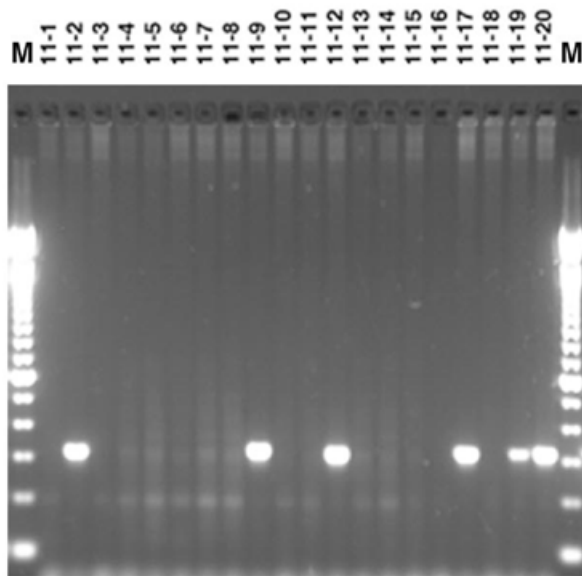


Figure S1.

Table S1. DNA and amino acid sequence changes in shuffled integrases

bp #	bp Change	aa #	aa Change	Cycle 1 Mutants	Cycle 2 Mutants
5	C -> T	2	Thr -> Ile		1C2
171	G -> A	silent		5C1	
195	G -> A	silent			11C2
225	G -> A	silent		1C1	
265	G -> A	89	Gly -> Arg		11C2
315	G -> A	silent			2C2
401	A -> C	134	Gln -> Pro	17C1	1C2, 2C2, 7C2, 11C2
479	A -> G	160	Lys -> Arg		11C2
507	C -> A	silent			7C2
508	G -> A	170	Glu -> Lys		7C2
511	T -> C	silent		1C1	
736	G -> A	246	Ala -> Thr	5C1	7C2
779	A -> G	260	Asp -> Gly		2C2
834	C -> T	silent			2C2
882	T -> C	silent		7C1	
906	C -> T	silent			2C2
921	G -> A	silent		17C1	
931	C -> T	311	Pro -> Ser		1C2
943	A -> G	315	Ile -> Val		11C2
1060	G -> A	354	Gly -> Arg	12C1	1C2, 11C2
1109	A -> G	370	Asp -> Gly	5C1	
1135	G -> A	379	Val -> Ile	1C1	7C2
1136	T -> C	379	Val -> Ala		2C2
1152	C -> T	silent			2C2
1158	A -> G	silent			11C2
1274	C -> T	425	Ala -> Val		1C2
1420	G -> A	474	Asp -> Asn		1C2
1423	G -> C	475	Ala -> Pro		2C2
1445	T -> C	483	Leu -> Pro	17C1	1C2
1509	A -> G	silent		1C1	
1542	G -> A	silent			1C2
1544	A -> T	515	Glu -> Val		11C2
1592	T -> C	531	Leu -> Pro		7C2
1678	G -> A	560	Val -> Met	7C1	
1707	C -> T	silent		1C1	1C2
1743	A -> G	silent		12C1	
1777	DELETE "G"	593 is new	frameshift *		11C2
1787	G -> A	596	Pro -> Gln		11C2
1788	G -> A	silent		5C1	1C2
1807	G -> A	603	Asp -> Asn		2C2
1813	DELETE "C"	605 is new	frameshift *	1C1	1C2, 7C2
1817	A -> G	606	Asp -> Gly	12C1	
1825	G -> C	609	Glu -> Gln	7C1	
1828	G -> C	610	Asp -> His	12C1	
1835	C -> T	612	Ala -> Val		2C2

*See Table S2.

Table S2. Amino acid changes in the last 20 residues of shuffled integrases

Mutant	aa Sequence change	Net charge	Charge difference
<i>Frameshift Changes</i>			
WT INT	aa 592 W AKPPTDDDEDDAQDGTEDVAA 613	-8	+14
11C2 frameshift at aa 593	W RSRQPPTTKTTPRTARKT 610	+6	
WT INT	aa 604 A QDGTEDVAA 613	-3	+6
1C1, 1C2, 7C2 frameshift at aa 605	A RTARKT 610	+3	
<i>Single Base Changes</i>			
WT	(aa#) P	0	0
11C2	596 Q	0	
WT	- D	-1	+1
2C2	603 N	0	
WT	- D	-1	+1
12C1	606 G	0	
WT	- E	-1	+1
7C1	609 Q	0	
WT	- D	-1	+2
12C1	610 H	+1	
WT	A	0	0
2C2	612 V	0	