What is claimed is:

1. A method for obtaining site-specific recombination in a eukaryotic cell, the method comprising: providing a eukaryotic cell that comprises a first recombination site and a second recombination site; contacting the first and second recombination sites with a prokaryotic recombinase polypeptide, resulting in recombination between the recombination sites, wherein the recombinase polypeptide can mediate recombination between the first and second recombination sites, the first recombination site is a phage genomic recombination attachment site (*att*P) or a bacterial genomic recombination attachment site (*att*B), the second recombination site is *att*B or *att*P, and the recombinase is selected from the group consisting of a *Listeria monocytogenes* phage recombinase, a *Streptococcus pyogenes* phage recombinase, a *Bacillus subtilis* phage recombinase, a *Mycobacterium tuberculosis* phage recombinase and a *Mycobacterium smegmatis* phage recombinase, provided that when the first recombination attachment site is *att*B, the second recombination attachment site is *att*P, and when the first recombination attachment site is *att*P, the second recombination attachment site is *att*B.

2. A method for obtaining site-specific recombination in a eukaryotic cell, the method comprising: providing a eukaryotic cell that comprises a first recombination site and a second recombination site; contacting the first and second recombination sites with a prokaryotic recombinase polypeptide, resulting in recombination between the recombination sites, wherein the recombinase polypeptide can mediate recombination between the first and second recombination sites, the first recombination site is *att*P or *att*B, the second recombination site is a pseudo attachment site, and the recombinase is selected from the group consisting of a *Listeria monocytogenes* phage recombinase, a *Streptococcus pyogenes* phage recombinase, a *Bacillus subtilis* phage recombinase, a *Mycobacterium tuberculosis* phage recombinase and a *Mycobacterium smegmatis* phage recombinase.

3. The method of claim 1 or 2, wherein the recombinase polypeptide is selected from the group consisting of an A118 recombinase, a SF370.1 recombinase, a SPβc2 recombinase, a ϕRv1 recombinase, and a Bxb1 recombinase.

4. The method of claim 1 or 2, wherein the recombinase-encoding polynucleotide is operably linked to a promoter which mediates expression of the polynucleotide in the eukaryotic cell.

5. The method of claim 1 or 2, wherein the recombinase polypeptide is introduced into the eukaryotic cell by expression of a polynucleotide that encodes the recombinase polypeptide.

6. The method of claim 1 or 2, wherein the recombinase polypeptide is introduced into the eukaryotic cell as a polypeptide.

7. The method of claim 1 or 2, wherein the recombinase polypeptide is introduced into the eukaryotic cell by messenger RNA that encodes the recombinase polypeptide.

8. The method of claim 1 or 2, wherein the site-specific recombination results in integration, deletion, inversion, translocation or exchange of DNA.

9. A method for obtaining a eukaryotic cell having a stably integrated polynucleotide sequence, the method comprising: introducing a polynucleotide into a eukaryotic cell that comprises a first recombination *att*B or *att*P site, wherein the polynucleotide comprises a nucleic acid sequence and a second recombination *att*P or *att*B site, and contacting the first and the second recombination sites with a prokaryotic recombinase polypeptide, wherein the recombinase polypeptide can mediate site-specific recombination between the first and second recombination sites, and the recombinase is selected from the group consisting of a *Listeria monocytogenes* phage recombinase, a *Streptococcus pyogenes* phage recombinase, a *Bacillus subtilis* phage recombinase, a *Mycobacterium tuberculosis* phage recombinase and a *Mycobacterium smegmatis* phage recombinase, provided that when the first recombination site is *att*B, the second recombination site is *att*P and when the first recombination site is *att*P, the second recombination site is *att*B.

10. A method for obtaining a eukaryotic cell having a stably integrated polynucleotide sequence, the method comprising: introducing a polynucleotide into a eukaryotic cell that comprises a first recombination pseudo attachment site, wherein the polynucleotide comprises a nucleic acid sequence and a second recombination *att*P or *att*B site, and contacting the first and the second recombination sites with a prokaryotic recombinase polypeptide, wherein the recombinase polypeptide can mediate site-specific recombination between the first and second recombination sites, and the recombinase is selected from the group consisting of a *Listeria monocytogenes* phage recombinase, a *Streptococcus pyogenes* phage recombinase, a *Bacillus subtilis* phage recombinase, a *Mycobacterium tuberculosis* phage recombinase and a *Mycobacterium smegmatis* phage recombinase.

11. The method of claim 9 or 10, wherein the recombinase polypeptide is selected from the group consisting of an A118 recombinase, a SF370.1 recombinase, a SPβc2 recombinase, a ϕRv1 recombinase, and a Bxb1 recombinase.

12. The method of claim 9 or 10, wherein the recombinase-encoding polynucleotide is operably linked to a promoter which mediates expression of the polynucleotide in the eukaryotic cell.

13. The method of claim 9 or 10, wherein the recombinase polypeptide is introduced into the eukaryotic cell by expression of a polynucleotide that encodes the recombinase polypeptide.

14. The method of claim 9 or 10, wherein the recombinase polypeptide is introduced into the eukaryotic cell as a polypeptide.

15. The method of claim 9 or 10, wherein the recombinase polypeptide is introduced into the eukaryotic cell by expression of RNA that encodes the recombinase polypeptide.

16. A method for obtaining site-specific recombination in a eukaryotic cell, the method comprising: providing a eukaryotic cell that comprises a first recombination site and a second recombination site with a polynucleotide sequence flanked by a third recombination site and a fourth

recombination site; contacting the recombination sites with a prokaryotic recombinase polypeptide, resulting in recombination between the recombination sites, wherein the recombinase polypeptide can mediate recombination between the first and third recombination sites and the second and fourth recombination sites, the first and second recombination sites are *att*P or *att*B, the third and fourth recombination sites are *att*B or *att*P, and the recombinase is selected from the group consisting of a *Listeria monocytogenes* phage recombinase, a *Streptococcus pyogenes* phage recombinase, a *Bacillus subtilis* phage recombinase, a *Mycobacterium tuberculosis* phage recombinase and a *Mycobacterium smegmatis* phage recombinase, provided that when the first and second recombination attachment sites are *att*B, the third and fourth recombination attachment sites are *att*P, and when the first and second recombination attachment sites are *att*P, the third and fourth recombination attachment sites are *att*B.

17. The method of claim 16, wherein the recombinase polypeptide is selected from the group consisting of an A118 recombinase, a SF370.1 recombinase, a SPβc2 recombinase, a ϕRv1 recombinase, and a Bxb1 recombinase.

18. The method of claim 16, wherein the recombinase polypeptide is introduced into the eukaryotic cell by expression of a polynucleotide that encodes the recombinase polypeptide.

19. The method of claim 16, wherein the recombinase polypeptide is introduced into the eukaryotic cell as a polypeptide.

20. The method of claim 16, wherein the recombinase polypeptide is introduced into the eukaryotic cell by messenger RNA that encodes the recombinase polypeptide.

21. A method for obtaining multiple site-specific recombinations in a eukaryotic cell, the method comprising: providing a eukaryotic cell that comprises a first recombination site and a second recombination site with a third recombination site and a fourth recombination site; contacting the first and second recombination sites with a first prokaryotic recombinase polypeptide, contacting the third and fourth recombination sites with a second prokaryotic recombinase polypeptide, resulting in recombination between the first and second recombination sites and recombination between the third and fourth recombination sites, wherein the first recombinase polypeptide can mediate recombination between the first and second recombination sites and the second recombinase polypeptide can mediate recombination between the third and fourth recombination sites, the first and second recombinase are selected from the group consisting of a *Listeria monocytogenes* phage recombinase, a *Streptococcus pyogenes* phage recombinase, a *Bacillus subtilis* phage recombinase, a *Mycobacterium tuberculosis* phage recombinase and a *Mycobacterium smegmatis* phage recombinase, provided that the first recombinase polypeptide and the second recombinase polypeptide are different.

22. The method of claim 21, further comprising a fifth recombination site and a sixth recombination site and a third recombinase polypeptide, wherein the third recombinase polypeptide

can mediate recombination between the fifth and sixth recombination sites, provided that the third recombinase polypeptide is different than the first and second recombinase polypeptides.

23. A method for site-specific recombination, the method comprising: providing a first recombination site and a second recombination site; contacting the first and second recombination sites with a prokaryotic recombinase polypeptide, resulting in recombination between the recombination sites, wherein the recombinase polypeptide can mediate recombination between the first and second recombination sites, the first recombination site is *att*P or *att*B, the second recombination site is *att*B or *att*P, and the recombinase is selected from the group consisting of a *Listeria monocytogenes* phage recombinase, a *Streptococcus pyogenes* phage recombinase, a *Bacillus subtilis* phage recombinase, a *Mycobacterium tuberculosis* phage recombinase and a *Mycobacterium smegmatis* phage recombinase, provided that when the first recombination attachment site is *att*B, the second recombination attachment site is *att*P, and when the first recombination attachment site is *att*P, the second recombination attachment site is *att*B.

24. A vector for site-specific integration of a polynucleotide sequence into the genome of an isolated eukaryotic cell, said vector comprising a polynucleotide of interest, and a second recombination *att*B or *att*P site, wherein said second recombination *att*B or *att*P site comprises a polynucleotide sequence that recombines with a first recombination *att*P or *att*B site or pseudo *att*P or pseudo *att*B site in the genome of said isolated eukaryotic cell and said recombination occurs in the presence of a site-specific recombinase selected from the group consisting of a *Listeria monocytogenes* phage recombinase, a *Streptococcus pyogenes* phage recombinase, a *Bacillus subtilis* phage recombinase, a *Mycobacterium tuberculosis* phage recombinase and a *Mycobacterium smegmatis* phage recombinase, provided that when the first recombination site is *att*B or pseudo *att*B, the second recombination site is *att*P and when the first recombination site is *att*P or pseudo *att*P, the second recombination site is *att*B.

25. The vector of claim 24, wherein the recombinase is selected from the group consisting of an A118 recombinase, a SF370.1 recombinase, a SPβc2 recombinase, a ϕRv1 recombinase, and a Bxb1 recombinase.

26. The vector of claim 24, wherein the polynucleotide of interest is operably linked to a promoter which mediates expression of the polynucleotide in the eukaryotic cell.

27. A eukaryotic cell that comprises a prokaryotic recombinase polypeptide or a nucleic acid that encodes a prokaryotic recombinase, wherein the recombinase can mediate site-specific recombination between a first recombination site and a second recombination site that can serve as a substrate for recombination with the first recombination site, wherein the first recombination site is *att*P, pseudo *att*P, *att*B or pseudo *att*B, the second recombination site is *att*B, pseudo *att*B, *att*P or pseudo *att*P, and the recombinase is selected from the group consisting of a *Listeria monocytogenes* phage recombinase, a *Streptococcus pyogenes* phage recombinase, a *Bacillus subtilis* phage recombinase, a

Mycobacterium tuberculosis phage recombinase and a *Mycobacterium smegmatis* phage recombinase, provided that when the first recombination site is *att*B, the second recombination site is *att*P or pseudo *att*P, when the first recombination site is pseudo *att*B, the second recombination site is *att*P, when the first recombination site is *att*P, the second recombination site is *att*B or pseudo *att*B, and when the first recombination site is pseudo *att*P, the second recombination site is *att*B.

28. The eukaryotic cell of claim 27, wherein the recombinase polypeptide is selected from the group consisting of an A118 recombinase, a SF370.1 recombinase, a SPβc2 recombinase, a ϕRv1 recombinase, and a Bxb1 recombinase.

29. A method for the site-specific integration of a polynucleotide of interest into the genome of a transgenic subject, wherein said genome comprises a first recombination *att*B or *att*P site or pseudo *att*B or pseudo *att*P site, the method comprising: introducing a nucleic acid that comprises the polynucleotide of interest and a second recombination *att*P or *att*B site; contacting the first and the second recombination sites with a prokaryotic recombinase polypeptide, wherein the recombinase polypeptide can mediate site-specific recombination between the first and second recombination sites, and the recombinase is selected from the group consisting of a *Listeria monocytogenes* phage recombinase, a *Streptococcus pyogenes* phage recombinase, a *Bacillus subtilis* phage recombinase, a *Mycobacterium tuberculosis* phage recombinase and a *Mycobacterium smegmatis* phage recombinase, provided that when the first recombination site is *att*B or pseudo *att*B, the second recombination site is *att*P and when the first recombination site is *att*P or pseudo *att*P, the second recombination site is *att*B.

30. The method of claim 29, wherein the recombinase polypeptide is selected from the group consisting of an A118 recombinase, a SF370.1 recombinase, a SPβc2 recombinase, a ϕRv1 recombinase, and a Bxb1 recombinase.

31. An isolated polynucleotide sequence comprising a nucleic acid that is at least 90% identical to the nucleic acid sequence selected from the group consisting of SEQ ID NO: 1, SEQ ID NO: 3, SEQ ID NO: 5, SEQ ID NO: 7, and SEQ ID NO: 9, wherein the nucleic acid has recombinase activity.

32. An isolated polynucleotide sequence comprising the nucleic acid sequence selected from the group consisting of SEQ ID NO: 1, SEQ ID NO: 3, SEQ ID NO: 5, SEQ ID NO: 7, and SEQ ID NO: 9.

33. An isolated polynucleotide sequence comprising a nucleic acid that is at least 90% identical to the nucleic acid sequence selected from the group consisting of SEQ ID NO: 11, SEQ ID NO: 13, SEQ ID NO: 14, SEQ ID NO: 15, SEQ ID NO: 16, SEQ ID NO: 17, SEQ ID NO: 18, SEQ ID NO: 19, SEQ ID NO: 20, and SEQ ID NO: 21.

34. An isolated polynucleotide sequence comprising the nucleic acid sequence selected from the group consisting of SEQ ID NO: 11, SEQ ID NO: 13, SEQ ID NO: 14, SEQ ID NO: 15, SEQ ID NO: 16, SEQ ID NO: 17, SEQ ID NO: 18, SEQ ID NO: 19, SEQ ID NO: 20, and SEQ ID NO: 21.

35. An isolated polynucleotide sequence comprising the nucleic acid sequence selected from the group consisting of:

a) a nucleic acid sequence that encodes a SPβc2 recombinase;

b) a nucleic acid sequence that encodes a SF370.1 recombinase;

c) a nucleic acid sequence that encodes a Bxb1 recombinase;

d) a nucleic acid sequence that encodes an A118 recombinase; and

e) a nucleic acid sequence that encodes a ϕRv1 recombinase.

Claims:

1. A method for obtaining site-specific recombination in an isolated eukaryotic cell, the method comprising: providing an isolated eukaryotic cell that comprises a first recombination site and a second recombination site with a polynucleotide sequence flanked by a third recombination site and a fourth recombination site; contacting the recombination sites with a prokaryotic recombinase polypeptide, resulting in recombination between the recombination sites, wherein the recombinase polypeptide can mediate recombination between the first and third recombination sites and the second and fourth recombination sites, the first and second recombination sites are *att*P or *att*B, the third and fourth recombination sites are *att*B or *att*P, and the recombinase is a *Mycobacterium tuberculosis* phage recombinase or a *Mycobacterium smegmatis* phage recombinase, wherein the recombinase is selected from the group consisting of a ΦRv1 recombinase and a Bxb1 recombinase, provided that when the first and second recombination attachment sites are *att*B, the third and fourth recombination attachment sites are *att*P, and when the first and second recombination attachment sites are *att*P, the third and fourth recombination attachment sites are *att*B.

2. The method of claim 1, wherein the recombinase polypeptide is introduced into the eukaryotic cell by expression of a polynucleotide that encodes the recombinase polypeptide.

3. The method of claim 1, wherein the recombinase polypeptide is introduced into the eukaryotic cell as a polypeptide.

4. The method of claim 1, wherein the recombinase polypeptide is introduced into the eukaryotic cell by messenger RNA that encodes the recombinase polypeptide.

5. A method for obtaining multiple site-specific recombinations in an isolated eukaryotic cell, the method comprising: providing an isolated eukaryotic cell that comprises a first recombination site and a second recombination site with a polynucleotide sequence

flanked by a third recombination site and a fourth recombination site; contacting the first and second recombination sites with a first prokaryotic recombinase polypeptide, contacting the third and fourth recombination sites with a second prokaryotic recombinase polypeptide, resulting in recombination between the first and second recombination sites and recombination between the third and fourth recombination sites, wherein the first recombinase polypeptide can mediate recombination between the first and second recombination sites and the second recombinase polypeptide can mediate recombination between the third and fourth recombination sites, the first and second recombinase are a *Mycobacterium tuberculosis* phage recombinase or a *Mycobacterium smegmatis* phage recombinase, wherein the recombinase is selected from the group consisting of ΦRv1 recombinase and Bxb1 recombinase, provided that the first recombinase polypeptide and the second recombinase polypeptide are different.

6. The method of claim 5, further comprising a fifth recombination site and a sixth recombination site and a third recombinase polypeptide, wherein the third recombinase polypeptide can mediate recombination between the fifth and sixth recombination sites, provided that the third recombinase polypeptide is different than the first and second recombinase polypeptides.

7. A vector for site-specific integration of a polynucleotide sequence into the genome of an isolated eukaryotic cell, said vector comprising a polynucleotide of interest, and a second recombination *att*B or *att*P site, wherein said second recombination *att*B or *att*P site comprises a polynucleotide sequence that recombines with a first recombination *att*P or *att*B site or pseudo *att*P or pseudo *att*B site in the genome of said isolated eukaryotic cell wherein said vector further comprises a polynucleotide that encodes a *Mycobacterium tuberculosis* phage recombinase or a *Mycobacterium smegmatis* phage recombinase, wherein the recombinase is selected from the group consisting of a ΦRv1 recombinase and a Bxb1 recombinase, provided that when the first recombination site is *att*B or pseudo *att*B, the second recombination site is *att*P and when the first recombination site is *att*P or pseudo *att*P, the second recombination site is *att*B.

8. The vector of claim 7, wherein the polynucleotide of interest is operably linked to a promoter which mediates expression of the polynucleotide in the eukaryotic cell.

9. An isolated polynucleotide sequence comprising a nucleic acid that is at least 90% identical to the nucleic acid sequence of SEQ ID NO: 5 or SEQ ID NO: 9, wherein the polypeptide encoded by the nucleic acid has recombinase activity.

10. The isolated polynucleotide sequence of claim 9, wherein the nucleic acid sequence is SEQ ID NO: 5 or SEQ ID NO: 9.