CLAIMS

We claim:

1. An isolated, living eukaryotic cell comprising at least one intracellular magnetotactic bacterium capable of being transferred to daughter cells of the eukaryotic cell through at least three cell divisions of the eukaryotic cell, wherein the isolated, living eukaryotic cell is a mammalian cell.

2. The isolated, living eukaryotic cell of claim 1, wherein the mammalian cell is a human cell.

3. The isolated, living eukaryotic cell of claim 2, wherein the human cell is a stem cell.

4. The isolated, living eukaryotic cell of claim 3, wherein the stem cell is selected from the group consisting of an embryonic stem cell, an inducible pluripotent stem cell, a mesenchymal stem cell, and an adult stem cell.

5. The isolated, living eukaryotic cell of claim 4, wherein the stem cell is an inducible pluripotent stem cell.

6. The isolated, living eukaryotic cell of claim 4, wherein the stem cell is a mesenchymal stem cell.

7. The isolated, living eukaryotic cell of claim 1, wherein the mammalian cell is a circulatory cell.

8. The isolated, living cell of claim 7, wherein the circulatory cell is a T-cell, a B-cell, a neutrophil, or a megakaryocyte.

9. The isolated, living cell of claim 8, wherein the circulatory cell is a T-cell.

10. The isolated living cell of claim 8, wherein the circulatory cell is a B-cell.

11. The isolated, living eukaryotic cell of claim 2, wherein the human cell is a cancer cell.

12. The isolated, living eukaryotic cell of claim 11, wherein the cancer cell is selected from the group consisting of a leukemia cell and a lymphoma cell.

13. The isolated, living eukaryotic cell of claim 11, wherein the cancer cell is a solid tumor cell.

14. The isolated, living eukaryotic cell of claim 13, wherein the solid tumor cell is selected from the group consisting of a colon tumor cell, a CNS tumor cell, a renal tumor cell, a melanoma tumor cell, an ovarian tumor cell, a breast tumor cell, and a prostate tumor cell.

15. The isolated, living eukaryotic cell of claim 11, wherein the cancer cell has been given a drug treatment.

16. The isolated, living eukaryotic cell of claim 1, wherein the mammalian cell is a murine cell.

17. The isolated, living eukaryotic cell of claim 16, where in the murine cell is a stem cell.

18. The isolated, living eukaryotic cell of claim 17, wherein the stem cell is selected from the group consisting of an embryonic stem cell, an inducible pluripotent stem cell, a mesenchymal stem cell, and an adult stem cell.

19. The isolated, living eukaryotic cell of claim 18, wherein the stem cell is an inducible pluripotent stem cell.

20. The isolated, living eukaryotic cell of claim 18, wherein the stem cell is a mesenchymal stem cell.

21. The isolated, living eukaryotic cell of claim 18, wherein the stem cell is an embryonic stem cell.

22. The isolated, living eukaryotic cell of claim 16, wherein the murine cell is a cancer cell.

23. The isolated, living eukaryotic cell of claim 22, wherein the cancer cell is selected from the group consisting of a leukemia cell and a lymphoma cell.

24. The isolated, living eukaryotic cell of claim 22, wherein the cancer cell is a solid tumor cell.

25. The isolated, living eukaryotic cell of claim 24, wherein the solid tumor cell is selected from the group consisting of a colon tumor cell, a CNS tumor cell, a renal tumor cell, a melanoma tumor cell, an ovarian tumor cell, a breast tumor cell, and a prostate tumor cell.

26. The isolated, living eukaryotic cell of claim 22, wherein the cancer cell has been given a drug treatment.

27. A method of creating an artificial endosymbiont, comprising introducing a magnetotactic bacterium into a eukaryotic host cell.

28. The method according to claim 27, wherein the eukaryotic host cell is a mammalian cell.

29. The cell according to claim 28, wherein the mammalian host cell is a murine cell.

30. The method according to claim 27, wherein the magnetotactic bacterium is a genetically modified bacterium.

31. The method according to claim 27, wherein the magnetotactic bacterium is selected from a strain selected from the group consisting of a *Magnetospirillum magneticum* strain AMB-1, a *M. magnetotactium*, a *M. gryphiswaldense*, a *M. polymorphum*, a *Magnetosprillum* sp. MSM-4, a *Magnetosprillum* sp. MSM-6, *Magnetococcus marinus*, and a *Magnetococcus* sp. Strain MC-1.

32. The method according to claim 31, wherein the introduction is achieved through a microinjection.

33. The method according to claim 31, wherein the introduction uses a liposome.

CLAIMS

We claim:

1. An isolated, living eukaryotic cell comprising at least one intracellular magnetotactic bacterium capable of being transferred to daughter cells of the eukaryotic cell through at least three cell divisions of the eukaryotic cell, wherein the isolated, living eukaryotic cell is a mammalian cell.

2. The isolated, living eukaryotic cell of claim 1, wherein the mammalian cell is a human cell.

3. The isolated, living eukaryotic cell of claim 2, wherein the human cell is a stem cell.

4. The isolated, living eukaryotic cell of claim 3, wherein the stem cell is selected from the group consisting of an embryonic stem cell, an inducible pluripotent stem cell, a mesenchymal stem cell, and an adult stem cell.

5. The isolated, living eukaryotic cell of claim 4, wherein the stem cell is an inducible pluripotent stem cell.

6. The isolated, living eukaryotic cell of claim 4, wherein the stem cell is a mesenchymal stem cell.

7. The isolated, living eukaryotic cell of claim 1, wherein the mammalian cell is a circulatory cell.

8. The isolated, living eukaryotic cell of claim 7, wherein the circulatory cell is a T-cell, a B-cell, a neutrophil, or a megakaryocyte.

9. The isolated, living eukaryotic cell of claim 8, wherein the circulatory cell is a T-cell.

10. The isolated living eukaryotic cell of claim 8, wherein the circulatory cell is a B-cell.

11. The isolated, living eukaryotic cell of claim 2, wherein the human cell is a cancer cell.

12. The isolated, living eukaryotic cell of claim 11, wherein the cancer cell is selected from the group consisting of a leukemia cell and a lymphoma cell.

13. The isolated, living eukaryotic cell of claim 11, wherein the cancer cell is a solid tumor cell.

14. The isolated, living eukaryotic cell of claim 13, wherein the solid tumor cell is selected from the group consisting of a colon tumor cell, a CNS tumor cell, a renal tumor cell, a melanoma tumor cell, an ovarian tumor cell, a breast tumor cell, and a prostate tumor cell.

15. The isolated, living eukaryotic cell of claim 11, wherein the cancer cell has been given a drug treatment.

16. The isolated, living eukaryotic cell of claim 1, wherein the mammalian cell is a murine cell.

17. The isolated, living eukaryotic cell of claim 16, where in the murine cell is a stem cell.

18. The isolated, living eukaryotic cell of claim 17, wherein the stem cell is selected from the group consisting of an embryonic stem cell, an inducible pluripotent stem cell, a mesenchymal stem cell, and an adult stem cell.

19. The isolated, living eukaryotic cell of claim 18, wherein the stem cell is an inducible pluripotent stem cell.

20. The isolated, living eukaryotic cell of claim 18, wherein the stem cell is a mesenchymal stem cell.

21. The isolated, living eukaryotic cell of claim 18, wherein the stem cell is an embryonic stem cell.

22. The isolated, living eukaryotic cell of claim 16, wherein the murine cell is a cancer cell.

23. The isolated, living eukaryotic cell of claim 22, wherein the cancer cell is selected from the group consisting of a leukemia cell and a lymphoma cell.

24. The isolated, living eukaryotic cell of claim 22, wherein the cancer cell is a solid tumor cell.

25. The isolated, living eukaryotic cell of claim 24, wherein the solid tumor cell is selected from the group consisting of a colon tumor cell, a CNS tumor cell, a renal tumor cell, a melanoma tumor cell, an ovarian tumor cell, a breast tumor cell, and a prostate tumor cell.

26. The isolated, living eukaryotic cell of claim 22, wherein the cancer cell has been given a drug treatment.

27. A method of creating an artificial endosymbiont, comprising introducing a magnetotactic bacterium into a eukaryotic host cell.

28. The method according to claim 27, wherein the eukaryotic host cell is a mammalian cell.

29. The method according to claim 28, wherein the mammalian host cell is a murine cell.

30. The method according to claim 27, wherein the magnetotactic bacterium is a genetically modified bacterium.

31. The method according to claim 27, wherein the magnetotactic bacterium is selected from a strain selected from the group consisting of a *Magnetospirillum magneticum* strain AMB-1, a *M. magnetotactium*, a *M gryphiswaldense*, a *M. polymorphum*, a *Magnetosprillum* sp. MSM-4, a *Magnetosprillum* sp. MSM-6, *Magnetococcus marinus*, and a *Magnetococcus* sp. Strain MC-I.

32. The method according to claim 31, wherein the introduction is achieved through a microinjection.

33. The method according to claim 31, wherein the introduction uses a liposome.