WHAT IS CLAIMED IS:

1. An endogenous germ cell-less fish, crustacean, or mollusk having a chimeric gonad, wherein the chimeric gonad comprises at least one transplanted germ cell having a mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells.

2. The endogenous germ cell-less fish, crustacean, or mollusk of claim 1, wherein the endogenous germ cell-less fish, crustacean, or mollusk is homozygous wild type in the germline at the locus for the mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells.

3. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-2, wherein the at least one germ cell is a Spermatogonial stem cell (SSC) or an Oogonial stem cell (OSC).

4. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-3, wherein the at least one germ cell is from a heterogametic male donor, such as XY.

5. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-3, wherein the at least one germ cell is from a homogametic female donor, such as XX.

6. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-3, wherein the at least one germ cell transplanted into the endogenous germ cell-less fish, crustacean, or mollusk that is female; and the endogenous germ cell-less fish, crustacean, or mollusk that is male, is an Oogonial stem cell (OSC) from a homogametic female donor, such as XX.

7. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-3, wherein the at least one germ cell transplanted into the endogenous germ cell-less fish, crustacean, or mollusk that is female; and the endogenous germ cell-less fish, crustacean, or mollusk that is male, is a Spermatogonial stem cell (SSC) from a heterogametic male donor, such as XY.

8. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-3, wherein the at least one germ cell is from a homogametic male donor, such as ZZ.

9. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-3, wherein the at least one germ cell is from a heterogametic female donor, such as WZ.

10. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-3, wherein the at least one germ cell transplanted into the endogenous germ cell-less fish, crustacean, or mollusk that is female; and the endogenous germ cell-less fish, crustacean, or mollusk that is male, is a Oogonial stem cell (OSC) from a heterogametic female donor, such as WZ.

11. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-3, wherein the at least one germ cell transplanted into the: endogenous germ cell-less fish, crustacean, or mollusk that is female; and the endogenous germ cell-less fish, crustacean, or mollusk that is male, is a Spermatogonial stem cell (SSC) from a homogametic male donor, such as ZZ.

12. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-3, wherein the at least one germ cell transplanted into the endogenous germ cell-less fish, crustacean, or mollusk that is female; and the endogenous germ cell-less fish, crustacean, or mollusk that is male, is a Oogonial stem cell (OSC) from a homogametic superfemale donor, such as WW.

13. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-3, wherein the at least one germ cell transplanted into the: endogenous germ cell-less fish, crustacean, or mollusk that is female; and the endogenous germ cell-less fish, crustacean, or mollusk that is male, is a Spermatogonial stem cell (SSC) from a homogametic supermale donor, such as YY.

14. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-13, wherein the at least one germ cell is transplanted into the peritoneal cavity of the embryo or hatchling of the endogenous germ cell-less fish, crustacean, or mollusk.

15. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-14, wherein the endogenous germ cell-less fish, crustacean, or mollusk has a null mutation in *dnd1, Elavl2, vasa, nanos3*, and/or *piwi-like* gene.

16. A method of generating an endogenous germ cell-less fish, crustacean, or mollusk, comprising the steps of:

transplanting at least one germ cell having a mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells, into an endogenous germ cell-less fish, crustacean, or mollusk, producing a chimeric gonad.

17. The method of claim 16, wherein the recipient fish, crustacean, or mollusk is homozygous wild type in the germline at the locus for the mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells.

18. The method of any one of claims 16-17, wherein the at least one germ cell is a Spermatogonial stem cell (SSC) or an Oogonial stem cell (OSC).

19. The method of any one of claims 16-18, wherein the at least one germ cell is from a heterogametic male donor, such as XY.

20. The method of any one of claims 16-18, wherein the at least one germ cell is from a homogametic female donor, such as XX.

21. The method of any one of claims 16-18, wherein the at least one germ cell transplanted into the endogenous germ cell-less fish, crustacean, or mollusk that is female; and the endogenous germ cell-less fish, crustacean, or mollusk that is male, is an Oogonial stem cell (OSC) from a homogametic female donor, such as XX.

22. The method of any one of claims 16-18, wherein the at least one germ cell transplanted into the endogenous germ cell-less fish, crustacean, or mollusk that is female; and the endogenous germ cell-less fish, crustacean, or mollusk that is male, is a Spermatogonial stem cell (SSC) from a heterogametic male donor, such as XY.

23. The method of any one of claims 16-18, wherein the at least one germ cell is from a homogametic male donor, such as ZZ.

24. The method of any one of claims 16-18, wherein the at least one germ cell is from a heterogametic female donor, such as WZ.

25. The method of any one of claims 16-18, wherein the at least one germ cell transplanted into the endogenous germ cell-less fish, crustacean, or mollusk that is female; and the endogenous germ cell-less fish, crustacean, or mollusk that is male, is a Oogonial stem cell (OSC) from a heterogametic female donor, such as WZ.

26. The method of any one of claims 16-18, wherein the at least one germ cell transplanted into the: endogenous germ cell-less fish, crustacean, or mollusk that is female; and the endogenous germ cell-less fish, crustacean, or mollusk that is male, is a Spermatogonial stem cell (SSC) from a homogametic male donor, such as ZZ.

27. The method of any one of claims 16-18, wherein the at least one germ cell transplanted into the endogenous germ cell-less fish, crustacean, or mollusk that is female; and the endogenous germ cell-less fish, crustacean, or mollusk that is male, is a Oogonial stem cell (OSC) from a homogametic superfemale donor, such as WW .

28. The method of any one of claims 16-18, wherein the at least one germ cell transplanted into the: endogenous germ cell-less fish, crustacean, or mollusk that is female; and the endogenous germ cell-less fish, crustacean, or mollusk that is male, is a Spermatogonial stem cell (SSC) from a homogametic supermale donor, such as YY.

29. The method of any one of claims 16-28, wherein the at least one germ cell is transplanted into the peritoneal cavity of the embryo or hatchling of the endogenous germ cell-less fish, crustacean, or mollusk.

30. The method of any one of claims 16-29, wherein the endogenous germ cell-less fish, crustacean, or mollusk has a null mutation in *dnd1, Elavl2, vasa, nanos3*, and/or *piwi-like* gene.

31. A method of generating a sterile fish, crustacean, or mollusk, comprising the steps of:

breeding (i) an endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-15 that is female with (ii) an endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-15 that is male, to produce the sterile fish crustacean, or mollusk.

32. A method of generating a sterile fish, crustacean, or mollusk, comprising the steps of:

breeding (i) an endogenous germ cell-less fish, crustacean, or mollusk produced by the method of any one of claims 16-30 that is female with (ii) an endogenous germ cell-less

fish, crustacean, or mollusk produced by the method of any one of claims 16-30 that is male, to produce the sterile fish crustacean, or mollusk.

33. An endogenous germ cell-less fish, crustacean, or mollusk having a chimeric gonad, wherein the chimeric gonad comprises at least one transplanted: a) Oogonial stem cell (OSC) from a homogametic female donor, such as XX, having a mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells; or b) Spermatogonial stem cell (SSC) from a homogametic male donor, such as ZZ, having a mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells.

34. The endogenous germ cell-less fish, crustacean, or mollusk of claim 33, wherein the endogenous germ cell-less fish, crustacean, or mollusk is homozygous wild type in the germline at the locus for the mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells.

35. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 33-34, wherein the at least one germ cell is transplanted into the peritoneal cavity of the embryo or hatchling of the endogenous germ cell-less fish, crustacean, or mollusk.

36. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 33-35, wherein the endogenous germ cell-less fish, crustacean, or mollusk has a null mutation in *dnd1, Elavl2, vasa, nanos3*, and/or *piwi-like* gene.

37. A method of generating an endogenous germ cell-less fish, crustacean, or mollusk, comprising the steps of:

transplanting at least one: a) Oogonial stem cell (OSC) from a homogametic female donor, such as XX, having a mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells; or b) Spermatogonial stem cell (SSC) from a homogametic male donor, such as ZZ, having a mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells, into an endogenous germ cell-less fish, crustacean, or mollusk, producing a chimeric gonad.

38. The method of claim 37, wherein the recipient fish, crustacean, or mollusk is homozygous wild type in the germline at the locus for the mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells.

39. The method of any one of claims 37-38, wherein the at least one germ cell is transplanted into the peritoneal cavity of the embryo or hatchling of the endogenous germ cell-less fish, crustacean, or mollusk.

40. The method of any one of claims 37-39, wherein the endogenous germ cell-less fish, crustacean, or mollusk has a null mutation in *dnd1, Elavl2, vasa, nanos3*, and/or *piwi-like* gene.

41. The method of any one of claims 37-39, wherein the male and/or female endogenous germ cell-less fish, crustacean, or mollusk has a null mutation in *dnd1, Elavl2, vasa, nanos3*, and/or *piwi-like* gene.

42. A method of generating a sterile sex-determined fish, crustacean, or mollusk, comprising the steps of:

breeding (i) an endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 33-36 that is female with (ii) an endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 33-36 that is male and from the same sex-determination system as the (i) female, to produce the sterile sex-determined fish, crustacean, or mollusk.

43. A method of generating a sterile sex-determined fish, crustacean, or mollusk, comprising the steps of:

breeding (i) an endogenous germ cell-less fish, crustacean, or mollusk produced by the method of any one of claims 37-41 that is female with (ii) an endogenous germ cell-less fish, crustacean, or mollusk produced by the method of any one of claims 37-41 that is male and from the same sex-determination system as the (i) female, to produce the sterile sex-determined fish, crustacean, or mollusk.

44. An endogenous germ cell-less fish, crustacean, or mollusk having a chimeric gonad, wherein the chimeric gonad comprises at least one transplanted: a) Oogonial stem cell (OSC) from a homogametic superfemale donor, such as WW, having a mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells; or b) Spermatogonial stem cell (SSC) from a homogametic supermale donor, such as YY, having

a mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells.

45. The endogenous germ cell-less fish, crustacean, or mollusk of claim 44, wherein the endogenous germ cell-less fish, crustacean, or mollusk is homozygous wild type in the germline at the locus for the mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells.

46. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 44-45, wherein the at least one germ cell is transplanted into the peritoneal cavity of the embryo or hatchling of the endogenous germ cell-less fish, crustacean, or mollusk.

47. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 44-46, wherein the endogenous germ cell-less fish, crustacean, or mollusk has a null mutation in *dnd1, Elavl2, vasa, nanos3*, and/or *piwi-like* gene.

48. A method of generating an endogenous germ cell-less fish, crustacean, or mollusk, comprising the steps of:

transplanting at least one: a) Oogonial stem cell (OSC) from a homogametic superfemale donor, such as WW, having a mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells; or b) Spermatogonial stem cell (SSC) from a homogametic supermale donor, such as YY, having a mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells, into an endogenous germ cell-less fish, crustacean, or mollusk, producing a chimeric gonad.

49. The method of claim 48, wherein the superfemale, such as WW, is generated by:

transplanting at least one Oogonial stem cell (OSC) from a heterogametic female donor, such as WZ, having a mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells, into a male and a female endogenous germ cell-less fish, crustacean, or mollusk, producing a chimeric gonad;

breeding the male endogenous germ cell-less fish, crustacean, or mollusk having a chimeric gonad with the female endogenous germ cell-less fish, crustacean, or mollusk having a chimeric gonad; and

selecting a progeny that is homogametic by genotypic selection.

50. The method of claim 48, wherein the supermale, such as YY, is generated by:

transplanting at least one Spermatogonial stem cell (SSC) from a heterogametic male donor, such as XY, having a mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells, into a male and a female endogenous germ cell-less fish, crustacean, or mollusk, producing a chimeric gonad;

breeding the male endogenous germ cell-less fish, crustacean, or mollusk having a chimeric gonad with the female endogenous germ cell-less fish, crustacean, or mollusk having a chimeric gonad; and

selecting a progeny that is homogametic by genotypic selection.

51. The method of any one of claims 48-50, wherein the recipient fish, crustacean, or mollusk is homozygous wild type in the germline at the locus for the mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells.

52. The method of any one of claims 48-51, wherein the at least one germ cell is transplanted into the peritoneal cavity of the embryo or hatchling of the endogenous germ cell-less fish, crustacean, or mollusk.

53. The method of any one of claims 48-52, wherein the endogenous germ cell-less fish, crustacean, or mollusk has a null mutation in *dnd1, Elavl2, vasa, nanos3*, and/or *piwi-like* gene.

54. A method of generating a sterile sex-determined fish, crustacean, or mollusk, comprising the steps of:

breeding (i) an endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 44-47 that is female with (ii) an endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 44-47 that is male and from the same sex-determination system as the (i) female, to produce the sterile sex-determined fish, crustacean, or mollusk.

55. A method of generating a sterile sex-determined fish, crustacean, or mollusk, comprising the steps of:

breeding (i) an endogenous germ cell-less fish, crustacean, or mollusk produced by the method of any one of claims 48-53 that is female with (ii) an endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 48-53 that is male and from the same sex-determination system as the (i) female, to produce the sterile sex-determined fish, crustacean, or mollusk.

56. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-15, 33-36, and 44-47, wherein disrupting the development and/or function of somatic gonadal cells comprises: disrupting gametogenesis; disrupting the development and/or function of testis and/or ovary cells; disrupting the development and/or function of Sertoli, Theca, Granulosa, and/or Leydig cells; disrupting at least one signaling molecule produced by Sertoli, Theca, Granulosa, and/or Leydig cells; and/or disrupting at least one secreted diffusible signal protein or growth factor protein that regulates Spermatogonial stem cell (SSC) and/or Oogonial stem cell (OSC) renewal and/or differentiation.

57. The endogenous germ cell-less fish, crustacean, or mollusk of claim 56, wherein the at least one secreted diffusible signal protein or growth factor protein is glial cell line-derived neurotrophic factor (GDNF); bone morphogenetic protein 4 (BMP4); stem cell factor (SCF); fibroblast growth factor 2 (FGF2); C-X-C motif chemokine 12 (CXCL12); and/or epidermal growth factor (EGF).

58. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-15, 33-36, 44-47, and 56-57, wherein the mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells is a mutation in microRNA miR-202.

59. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-15, 33-36, 44-47, and 56-58, wherein the at least one germ cell is from about 500 germ cells to about 6,000 germ cells.

60. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-15, 33-36, 44-47, and 56-59, wherein the endogenous germ cell-less fish, crustacean, or mollusk is created: using ploidy manipulation, such as triploidy manipulation; by hybridization; using exposure to high levels of sex hormones; using morpholinos; using sterile hybrids; and/or using chemical exposure.

61. The endogenous germ cell-less fish, crustacean, or mollusk of any one of claims 1-15, 33-36, 44-47, and 56-60, wherein the fish, crustacean, or mollusk is Atlantic salmon, Rainbow Trout, Coho Salmon, tilapia, cobia, Seriola spp., Grouper, Snapper, barramundi, Sea Bream, Sea Bass, lumpfish, sturgeon, Litopeneus vannamei, Peneaus monodon, oysters, clams or mussels.

62. The method of any one of claims 16-32, 37-43, and 48-55, wherein disrupting the development and/or function of somatic gonadal cells comprises: disrupting gametogenesis;

disrupting the development and/or function of testis and/or ovary cells; disrupting the development and/or function of Sertoli, Theca, Granulosa, and/or Leydig cells; disrupting at least one signaling molecule produced by Sertoli, Theca, Granulosa, and/or Leydig cells; and/or disrupting at least one secreted diffusible signal protein or growth factor protein that regulates Spermatogonial stem cell (SSC) and/or Oogonial stem cell (OSC) renewal and/or differentiation.

63. The method of claim 62, wherein the at least one secreted diffusible signal protein or growth factor protein is glial cell line-derived neurotrophic factor (GDNF); bone morphogenetic protein 4 (BMP4); stem cell factor (SCF); fibroblast growth factor 2 (FGF2); C-X-C motif chemokine 12 (CXCL12); and/or epidermal growth factor (EGF).

64. The method of any one of claims 16-32, 37-43, 48-55, and 62-63 wherein the mutation that is present in the germline and disrupts the development and/or function of somatic gonadal cells is a mutation in microRNA miR-202.

65. The method of any one of claims 16-32, 37-43, 48-55, and 62-64, wherein the at least one germ cell is from about 500 germ cells to about 6,000 germ cells.

66. The method of any one of claims 16-32, 37-43, 48-55, and 62-65, wherein the endogenous germ cell-less fish, crustacean, or mollusk is created: using ploidy manipulation, such as triploidy manipulation; by hybridization; using exposure to high levels of sex hormones; using morpholinos; using sterile hybrids; and/or using chemical exposure.

67. The method of any one of claims 16-32, 37-43, 48-55, and 62-66, wherein the fish, crustacean, or mollusk is Atlantic salmon, Rainbow Trout, Coho Salmon, tilapia, cobia, Seriola spp., Grouper, Snapper, barramundi, Sea Bream, Sea Bass, lumpfish, sturgeon, Litopeneus vannamei, Peneaus monodon, oysters, clams or mussels.

68. The fish, crustacean, or mollusk produced by the method of any one of claims 16-32, 37-43, 48-55, and 62-67.