CLAIMS

1. A genetically engineered microorganism capable of converting cholesterol, cholesterol analogs and derivatives into steroid hormones precursors, wherein said microorganism comprises at least one DNA sequence encoding a cytochrome P450 of eukaryotic origin, an exogenous DNA sequence encoding Adx and an exogenous DNA sequence encoding AdR.

2. Genetically engineered microorganism according to claim 1, wherein said cytochrome P450 of eukaryotic origin is selected from the group consisting of CYP11A1, CYP17A1, CYP11B1, CYP11B2, CYP3A4, CYP46A1, CYP27A1, CYP21A1 and CYP21A2.

3. Genetically engineered microorganism according to claim 1 or claim 2, wherein said exogenous DNA sequences have been introduced into said microorganism by means of genetic engineering techniques.

4. Genetically engineered microorganism according to claim 3, wherein said microorganism has been transformed with at least one plasmid comprising said exogenous DNA sequences.

5. Genetically engineered microorganism according to any one of claims 1 to 4, wherein said exogenous DNA sequences are integrated into the genome of said microorganism.

6. Genetically engineered microorganism according to any one of claims 1 to 5, wherein said microorganism further comprises a functional endogenous polymerase system capable of building polyhydroxyalkanoate bodies.

7. Genetically engineered microorganism according to any one of claims 1 to 6, wherein said microorganism is *Bacillus megaterium*.

8. Genetically engineered microorganism according to claim 7, wherein said microorganism is *Bacillus megaterium* MS941 strain.

9. Genetically engineered microorganism according to anyone of claims 1 to 8, wherein the expression of at least one gene involved in the building of polyhydroxyalkanoate bodies is modulated.

10. A method for producing steroid hormones precursors, comprising the steps of:
    a. Providing a microorganism according to any one of claims 1 to 9,
    b. Culturing said microorganism under conditions allowing the expression of said exogenous DNA sequences,
    c. Contacting said microorganism culture with a substrate selected from the group consisting of cholesterol, cholesterol analogs and derivatives, and
    d. Recovering steroid hormones precursors.

11. The method according to claim 10, wherein:
    a. said substrate is selected from the group consisting of cholesterol, campesterol, ergostadienol, desmosterol, beta-sitosterol, generol and a mixture of oxysterols, and
    b. said steroid hormones precursor is pregnenolone.

12. The method according to claims 10 or 11 wherein said substrates are solubilized into β-cyclodextrin and saponin.

13. A method of preparing recombinant strains which are improved with respect to the conversion of cholesterol, cholesterol analogs and derivatives into steroid hormones precursors, comprising the steps of:
    a. Providing a microorganism,
    b. Introducing by means of genetic engineering techniques into said microorganism at least one DNA sequence encoding a cytochrome P450 of eukaryotic origin, an exogenous DNA sequence encoding Adx, and an exogenous DNA sequence encoding AdR.

14. The method according to claim 13, wherein said cytochrome P450 of eukaryotic origin is selected from the group consisting of CYP11A1, CYP17A1, CYP11B1, CYP11B2, CYP3A4, CYP46A1, CYP27A1, CYP21A1 and CYP21A2.

15. The method according to claim 13 or claim 14, wherein said microorganism comprises a functional endogenous polymerase system capable of building polyhydroxyalkanoate bodies.

16. The method according to claim 13 to 15, wherein said microorganism is *Bacillus megaterium*.

17. The method according to claim 16, wherein said microorganism is *Bacillus megaterium* MS941 strain.

18. The method according to anyone of claims 13 to 17, further comprising the step of modulating by means of genetic engineering techniques into said microorganism, the expression of at least one gene involved in the building of PHA-bodies.

19. A method for increasing the storage capacity of a microorganism for (i) cholesterol, cholesterol analogs and derivatives thereof and/or (ii) steroid hormones precursors and derivatives thereof comprising the steps of:
    a. Providing a microorganism comprising a functional endogenous polymerase system capable of building polyhydroxyalkanoate bodies; and
    b. modulating by means of genetic engineering techniques into said microorganism, the expression of at least one gene involved in the building of PHA-bodies,

    thereby obtaining a microorganism with increased storage capacity for (i) cholesterol, cholesterol analogs and derivatives thereof and/or (ii) steroid hormones precursors and derivatives thereof.

20. The method of claim 19, wherein said storage capacity is proportionally increased with respect to PhaC polymerase gene expression.

21. The method according to claim 19 or 20, wherein said microorganism is *Bacillus megaterium*.

22. The method according to claim 21, wherein said microorganism is *Bacillus megaterium* MS941 strain.

CLAIMS

1. A genetically engineered microorganism capable of converting cholesterol, cholesterol analogs and derivatives into steroid hormones precursors, wherein said microorganism comprises at least one DNA sequence encoding a cytochrome P450 of eukaryotic origin, an exogenous DNA sequence encoding Adx and an exogenous DNA sequence encoding AdR and wherein said microorganism is *Bacillus megaterium*.

2. Genetically engineered microorganism according to claim 1, wherein said cytochrome P450 of eukaryotic origin is selected from the group consisting of CYP11A1, CYP17A1, CYP11B1, CYP11B2, CYP3A4, CYP46A1, CYP27A1, CYP21A1 and CYP21A2.

3. Genetically engineered microorganism according to claim 1 or claim 2, wherein said exogenous DNA sequences have been introduced into said microorganism by means of genetic engineering techniques.

4. Genetically engineered microorganism according to claim 3, wherein said microorganism has been transformed with at least one plasmid comprising said exogenous DNA sequences.

5. Genetically engineered microorganism according to any one of claims 1 to 4, wherein said exogenous DNA sequences are integrated into the genome of said microorganism.

6. Genetically engineered microorganism according to any one of claims 1 to 5, wherein said microorganism further comprises a functional endogenous polymerase system capable of building polyhydroxyalkanoate bodies.

7. Genetically engineered microorganism according to claim 1, wherein said microorganism is *Bacillus megaterium* MS941 strain.

8. Genetically engineered microorganism according to anyone of claims 1 to 7, wherein the expression of at least one gene involved in the building of polyhydroxyalkanoate bodies is modulated.

9. A method for producing steroid hormones precursors, comprising the steps of:
    a. Providing a microorganism according to any one of claims 1 to 8,
    b. Culturing said microorganism under conditions allowing the expression of said exogenous DNA sequences,
    c. Contacting said microorganism culture with a substrate selected from the group consisting of cholesterol, cholesterol analogs and derivatives, and
    d. Recovering steroid hormones precursors.

10. The method according to claim 9, wherein:
    a. said substrate is selected from the group consisting of cholesterol, campesterol, ergostadienol, desmosterol, beta-sitosterol, generol and a mixture of oxysterols, and
    b. said steroid hormones precursor is pregnenolone.

11. The method according to claims 9 or 10 wherein said substrates are solubilized into β-cyclodextrin and saponin.

12. A method of preparing recombinant strains which are improved with respect to the conversion of cholesterol, cholesterol analogs and derivatives into steroid hormones precursors, comprising the steps of:
    a. Providing a microorganism,
    b. Introducing by means of genetic engineering techniques into said microorganism at least one DNA sequence encoding a cytochrome P450 of eukaryotic origin, an exogenous DNA sequence encoding Adx, and an exogenous DNA sequence encoding AdR,

    wherein said microorganism is *Bacillus megaterium*.

13. The method according to claim 12, wherein said cytochrome P450 of eukaryotic origin is selected from the group consisting of CYP11A1, CYP17A1, CYP11B1, CYP11B2, CYP3A4, CYP46A1, CYP27A1, CYP21A1 and CYP21A2.

14. The method according to claim 12 or claim 13, wherein said microorganism comprises a functional endogenous polymerase system capable of building polyhydroxyalkanoate bodies.

15. The method according to claim 12, wherein said microorganism is *Bacillus megaterium* MS941 strain.

16. The method according to any one of claims 12 to 15, further comprising the step of modulating by means of genetic engineering techniques into said microorganism, the expression of at least one gene involved in the building of PHA-bodies.