We Claim

1. A collection of synthetic antibodies or functional fragments thereof, comprising variable heavy chain and variable light chain framework regions,

wherein said variable heavy chain framework regions and variable light chain framework regions comprise germline protein sequences of a germline protein pair,

wherein said germline protein pair comprises the following properties:

i) a relative display rate in Fab format comprising a value within the top 75% of Fabs sampled;

ii) an expression level in Fab format of at least 0.4 as compared to Fab VH 1-69 VLA_VI1-40 AYA, the sequences of which are depicted in Table 5, Table 9, Figure 45A and Figure 47A;

iii) thermal stability at 60°C or more for at least 45 minutes in Fab format;

iv) stability in bovine or mouse serum in Fab format for greater than ten days at 37°C;

v) an expression level in IgG format of at least 0.4 as compared to MOR03080, the CDR sequences of which are depicted in Table 31; and

vi) stability in serum in IgG format for fourteen days at 37°C;

wherein said collection of antibodies or functional fragments thereof comprises germline protein sequences of at least two different germline protein pairs, and wherein said germline protein pair is encoded by a germline gene pair,

wherein the germline protein pairs are selected from IGHV1-18/IGKV1-05; IGHV1-18/IGLV2-23; IGHV1-46/IGHV1-09; IGHV1-46/IGKV1-39; IGHV1-46/IGKV3-15; IGHV1-69*01/IGKV1-05; IGHV3-07/IGKV1-09; IGHV3-07/IGKV1-12; IGHV3-07/IGKV1-27; IGHV3-07/IGKV3-15; IGHV3-07/IGLV1-47; IGHV3-07/IGLV2-23; IGHV3-07/IGLV3-01; IGHV3-11/IGKV1-05; IGHV3-11/IGKV1-06; IGHV3-11/IGKV1-12; IGHV3-11/IGKV1-16; IGHV3-11/IGKV3-15; IGHV3-11/IGLV1-47; IGHV3-11/IGLV2-23; IGHV3-15/IGKV1-05; IGHV3-15/IGKV1-06; IGHV3-15/IGKV1-09; IGHV3-15/IGKV1-12; IGHV3-15/IGKV1-16; IGHV3-15/IGKV1-27; IGHV3-15/IGKV1-39; IGHV3-15/IGKV3-15; IGHV3-15/IGLV1-40; IGHV3-15/IGLV1-51; IGHV3-15/IGLV2-11; IGHV3-21/IGKV1-06; IGHV3-21/IGKV1-12; IGHV3-21/IGKV1-27; IGHV3-21/IGKV1-39; IGHV3-21/IGLV2-14; IGHV3-21/IGLV2-23; IGHV3-30/IGLV2-23; IGHV3-30/IGLV3-1; IGHV3-33/IGKV3-15; IGHV3-33/IGLV2-23; IGHV3-48/IGKV1-27; IGHV3-53/IGKV1-09; IGHV3-53/IGKV1-12; IGHV3-53/IGLV1-51; IGHV3-53/IGLV2-23; IGHV3-53/IGLV3-1; IGHV3-74/IGKV1-06; IGHV3-74/IGKV1-09; IGHV3-74/IGKV1-27; IGHV3-74/IGKV3-15; IGHV3-74/IGLV1-51; IGHV4-04/IGLV2-23; IGHV4-04/IGLV3-1; IGHV4-04/IGLV3-21; IGHV4-39/IGLV2-14; IGHV4-39/IGLV3-1; IGHV5-51/IGKV1-09; IGHV5-51/IGLV2-23; IGHV5-51/IGLV3-1; IGHV6-1/IGKV1-06; and IGHV6-1/IGLV2-23, the sequences of which are depicted in Figures 45 A-C, Figures 46 A-C and Figures 47 A-B.

2. A collection according to claim 1, wherein said variable heavy chain and variable light chain framework regions consist essentially of germline protein sequences of the germline protein pairs comprising the following properties:

i) a relative display rate in Fab format comprising a value within the top 75% of Fabs sampled;

ii) an expression level in Fab format of at least 0.4 as compared to Fab VH 1-69 VLA_VI1-40 AYA, the sequences of which are depicted in Table 5, Table 9, Figure 45A and Figure 47A;

iii) thermal stability at 60°C or more for at least 45 minutes in Fab format;

iv) stability in bovine or mouse serum in Fab format for greater than ten days at 37°C;

v) an expression level in IgG format of at least 0.4 as compared to MOR03080, the CDR sequences of which are depicted in Table 31; and

vi) stability in bovine serum in IgG format for fourteen days at 37°C.

3. A collection according to claims 1 or 2, wherein said variable heavy chain and variable light chain framework regions consist of germline protein sequences of the germline protein pairs comprising the following properties:

i) a relative display rate in Fab format comprising a value within the top 75% of Fabs sampled;

ii) an expression level in Fab format of at least 0.4 as compared to Fab VH1-69 VLA_VI1-40 AYA, the sequences of which are depicted in Table 5, Table 9, Figure 45A and Figure 47A;

iii) thermal stability at 60°C or more for at least 45 minutes in Fab format;

iv) stability in bovine or mouse serum in Fab format for greater than ten days at 37°C;

v) an expression level in IgG format of at least 0.4 as compared to MOR03080, the CDR sequences of which are depicted in Table 31; and

vi) stability in bovine serum in IgG format for fourteen days at 37°C.

4. A collection according to any one of the preceding claims, wherein said germline gene pairs are present at a concentration of at least 0.05% in the human immune repertoire.

5. A collection according to any one of the preceding claims, wherein said germline gene pairs are present at a concentration of at least 0.07% in the naïve human immune repertoire.

6. The collection according to any one of the preceding claims, wherein said antibodies or functional fragments thereof comprise human sequences.

7. The collection according to any one of the preceding claims, wherein said collection of antibodies or functional fragments thereof comprises germline protein sequences of at least seventeen different germline protein pairs.

8. The collection according to any one of the preceding claims, wherein said antibodies or functional fragments thereof comprise one or more complementarity determining regions comprising germline protein sequences.

9. The collection according to any one of the preceding claims, wherein said antibodies or functional fragments thereof comprise FR1, CDR1, FR2, CDR2, and FR3 regions comprising germline protein sequences.

10. The collection according to any one of the preceding claims, wherein said antibodies or functional fragments thereof comprise a FR4 region selected from the group consisting of: JH4, Jκ1, and Jλ2/3.

11. The collection according to any one of the preceding claims, wherein said antibodies or functional fragments thereof comprise a diversified HCDR3 region.

12. The collection according to any one of the preceding claims, wherein said antibodies or functional fragments thereof comprise a diversified LCDR3 region.

13. The collection according to any one of the preceding claims, wherein the collection comprises 1 X 10^4 antibodies or functional fragments thereof.

14. The collection according to any one of the preceding claims, wherein said germline protein pairs comprise a relative display rate in Fab format comprising a value within the top 60% of Fabs sampled.

15. The collection according to any one of the preceding claims, wherein said germline protein pairs comprise an expression level in Fab format of at least 0.6 as compared to Fab VH1-69 VLA_VI1-40 AYA, the sequences of which are depicted in Table 5, Table 9, Figure 45A and Figure 47A.

16. The collection according to any one of the preceding claims, wherein said germline protein pairs comprise an expression level in IgG format of at least 0.6 as compared to MOR03080.

17. The collection according to any one of the preceding claims, wherein said functional fragments of said antibodies are selected from the group consisting of Fab, F(ab')2, Fab', Fv, and scFv.

18. A collection of nucleic acids encoding the collection according to any one of the preceding claims.

19. A collection of vectors comprising the nucleic acids according to claim 18.

20. A collection of recombinant host cells comprising the nucleic acids of claim 18 or the vectors of claim 19.

21. The recombinant host cells of claim 20, which are prokaryotic or eukaryotic.

22. The recombinant host cells of claim 21 which are *E. coli* or mammalian.

23. A method of producing the collection of synthetic antibodies or functional fragments thereof according to any one of claims 1-3.

24. A method according to claim 23, wherein the step of producing further comprises the steps of

a) obtaining data comprising the variable heavy chain and variable light chain germline gene pairs present in the human immune repertoire;

b) identifying the variable heavy chain and variable light chain germline protein pairs comprising the following properties:

i) a relative display rate in Fab format comprising a value within the top 75% of Fabs sampled;

ii) an expression level in Fab format of at least 0.4 as compared to Fab VH 1-69 VLA_VI1-40 AYA, the sequences of which are depicted in Table 5, Table 9, Figure 45A and Figure 47A;

iii) thermal stability at 60°C or more for at least 45 minutes in Fab format;

iv) stability in bovine or mouse serum in Fab format for greater than ten days at 37°C;

v) an expression level in IgG format of at least 0.4 as compared to MOR3080, the CDR sequences of which are depicted in Table 31; and

vi) stability in bovine serum in IgG format for fourteen days at 37°C; and

c) generating a collection of antibodies or functional fragments thereof comprising the variable heavy chain and variable light chain germline protein sequences of the germline protein pairs identified in step b).

25. A method according to claim 24, wherein step b) further comprises the steps of

ba) identifying the variable heavy chain and variable light chain germline gene pairs present at a concentration of at least 0.05% in the human immune repertoire;

bb) generating antibodies or functional fragments thereof comprising the germline protein pairs identified in step ba); and

bc) evaluating the following properties of said germline protein pairs:

i) relative display rate in Fab format;

ii) expression level in Fab format;

iii) thermal stability at 60°C or more in Fab format;

iv) stability in bovine or mouse serum in Fab format for greater than ten days at 37°C;

v) expression level in IgG format; and

vi) stability in bovine serum in IgG format for fourteen days at 37°C.