

herein comprise nucleic acids for specifically targeting and editing a gene, a gene cluster, a biological pathway, or an entire genome.

[0006] Provided herein are nucleic acid libraries, wherein the nucleic acid library comprises at least 500 non-identical DNA molecules, wherein each non-identical DNA molecule encodes for a different gRNA sequence, and wherein at least about 80% of the at least 500 non-identical DNA molecules are each present in the nucleic acid library in an amount within 2x of a mean frequency for each of the non-identical DNA molecules in the library. Provided herein are nucleic acid libraries, wherein each non-identical DNA molecule has a GC base content of about 20% to about 85%. Provided herein are nucleic acid libraries, wherein each non-identical DNA molecule has a GC base content of about 30% to about 70%. Provided herein are nucleic acid libraries, wherein at least about 90% of the at least 500 non-identical DNA molecules are each present in the nucleic acid library in an amount within 2x of the mean frequency for each of the non-identical DNA molecules in the library. Provided herein are nucleic acid libraries, wherein at least 99% of the at least 500 non-identical DNA molecules are each present in the nucleic acid library in an amount within 2x of the mean frequency for each of the non-identical DNA molecules in the library. Provided herein are nucleic acid libraries, wherein the at least 500 non-identical DNA molecules comprises at least 2000 non-identical DNA molecules. Provided herein are nucleic acid libraries, wherein the at least 500 non-identical DNA molecules comprises at least 3500 non-identical DNA molecules. Provided herein are nucleic acid libraries, wherein the at least 500 non-identical DNA molecules comprises at least 100,000 non-identical DNA molecules. Provided herein are nucleic acid libraries, wherein each non-identical DNA molecule comprises up to 200 bases in length. Provided herein are nucleic acid libraries, wherein each non-identical DNA molecule comprises about 100 to about 200 bases in length. Provided herein are nucleic acid libraries, wherein the at least 500 non-identical DNA molecules comprises non-identical DNA molecules encoding for gRNA sequences targeting genes in a biological pathway. Provided herein are nucleic acid libraries, wherein the at least 500 non-identical DNA molecules comprises non-identical DNA molecules encoding for gRNA sequences targeting genes in an entire genome. Provided herein are nucleic acid libraries, wherein the gRNA is a single gRNA or a dual gRNA.

[0006a] Provided herein is a nucleic acid library, wherein the nucleic acid library comprises at least 500 non-identical DNA molecules, wherein each non-identical DNA molecule encodes for a different gRNA sequence, wherein each gRNA sequence comprises a targeting domain complementary to a mammalian gene, and wherein at least about 80% of the at least 500 non-identical DNA molecules are each present in the nucleic acid library in an amount within 2x of a mean frequency for each of the non-identical DNA molecules in the library.

[0006b] Provided herein is a nucleic acid library, wherein the nucleic acid library comprises at least 2000 non-identical nucleic acids, wherein each non-identical nucleic acid encodes for a different gRNA sequence, wherein each gRNA sequence comprises a targeting domain complementary to a eukaryotic gene, and wherein at least about 80% of the at least 2000 non-identical nucleic acids are present in the nucleic acid library in an amount within 2x of a mean frequency for each of the non-identical nucleic acids in the library.

[0006c] Provided herein is an amplicon library, wherein the amplicon library comprises a plurality of non-identical DNA molecules, wherein each non-identical DNA molecule is present in a population of amplification products, wherein each non-identical DNA molecule encodes for a different gRNA sequence, wherein each gRNA sequence comprises a targeting domain complementary to a eukaryotic gene, and wherein at least about 80% of the plurality of non-identical DNA molecules are each present in the amplicon library in an amount within 2x of a mean frequency for each of the non-identical DNA molecules in the library.

[0007] Provided herein are nucleic acid libraries, wherein the nucleic acid library comprises at least 2000 non-identical nucleic acids, wherein each non-identical nucleic acid encodes for a different sgRNA sequence, wherein each sgRNA sequence comprises a targeting domain complementary to a eukaryotic gene, and wherein at least about 80% of the at least 2000 non-identical nucleic acids are present in the nucleic acid library in an amount within 2x of a mean frequency for each of the non-identical nucleic acids in the library. Provided herein are nucleic

CLAIMS

WHAT IS CLAIMED IS:

1. A nucleic acid library, wherein the nucleic acid library comprises at least 500 non-identical DNA molecules, wherein each non-identical DNA molecule encodes for a different gRNA sequence, wherein each gRNA sequence comprises a targeting domain complementary to a mammalian gene, and wherein at least about 80% of the at least 500 non-identical DNA molecules are each present in the nucleic acid library in an amount within 2x of a mean frequency for each of the non-identical DNA molecules in the library.
2. The nucleic acid library of claim 1, wherein each non-identical DNA molecule has a GC base content of about 20% to about 85%.
3. The nucleic acid library of claim 1, wherein each non-identical DNA molecule has a GC base content of about 30% to about 70%.
4. The nucleic acid library of claim 1, wherein at least about 90% of the at least 500 non-identical DNA molecules are each present in the nucleic acid library in an amount within 2x of the mean frequency for each of the non-identical DNA molecules in the library.
5. The nucleic acid library of claim 1, wherein at least 99% of the at least 500 non-identical DNA molecules are each present in the nucleic acid library in an amount within 2x of the mean frequency for each of the non-identical DNA molecules in the library.
6. The nucleic acid library of claim 1, wherein the at least 500 non-identical DNA molecules comprise at least 2000 non-identical DNA molecules.
7. The nucleic acid library of claim 1, wherein the at least 500 non-identical DNA molecules comprise at least 3500 non-identical DNA molecules.
8. The nucleic acid library of claim 1, wherein the at least 500 non-identical DNA molecules comprise at least 100,000 non-identical DNA molecules.
9. The nucleic acid library of claim 1, wherein each non-identical DNA molecule comprise up to 200 bases in length.
10. The nucleic acid library of claim 1, wherein each non-identical DNA molecule comprises about 100 to about 200 bases in length.
11. The nucleic acid library of claim 1, wherein the at least 500 non-identical DNA molecules comprises non-identical DNA molecules encoding for gRNA sequences targeting genes in a biological pathway.

12. The nucleic acid library of claim 1, wherein the at least 500 non-identical DNA molecules comprises non-identical DNA molecules encoding for gRNA sequences targeting genes in an entire genome.
13. The nucleic acid library of claim 1, wherein the gRNA is a single gRNA or a dual gRNA.
14. A nucleic acid library, wherein the nucleic acid library comprises at least 2000 non-identical nucleic acids, wherein each non-identical nucleic acid encodes for a different gRNA sequence, wherein each gRNA sequence comprises a targeting domain complementary to a eukaryotic gene, and wherein at least about 80% of the at least 2000 non-identical nucleic acids are present in the nucleic acid library in an amount within 2x of a mean frequency for each of the non-identical nucleic acids in the library.
15. The nucleic acid library of claim 14, wherein each non-identical nucleic acid has a GC base content of about 20% to about 85%.
16. The nucleic acid library of claim 14, wherein each non-identical nucleic acid has a GC base content of about 30% to about 70%.
17. The nucleic acid library of claim 14, wherein at least about 90% of the at least 2000 non-identical nucleic acids are each present in the nucleic acid library in an amount within 2x of the mean frequency for each of the non-identical nucleic acids in the library.
18. The nucleic acid library of claim 14, wherein at least 99% of the at least 2000 non-identical nucleic acids are each present in the nucleic acid library in an amount within 2x of the mean frequency for each of the non-identical nucleic acids in the library.
19. The nucleic acid library of claim 14, wherein each non-identical nucleic acid comprises up to 200 bases in length.
20. The nucleic acid library of claim 14, wherein each non-identical nucleic acid comprises about 100 to about 200 bases in length.
21. The nucleic acid library of claim 14, wherein the at least 2000 non-identical nucleic acids comprise non-identical nucleic acids encoding for gRNA sequences targeting genes in a biological pathway.
22. The nucleic acid library of claim 14, wherein the at least 2000 non-identical nucleic acids comprise non-identical nucleic acids encoding for gRNA sequences targeting genes in an entire genome.
23. The nucleic acid library of claim 14, wherein each non-identical nucleic acid comprises DNA or RNA molecules.

24. An amplicon library, wherein the amplicon library comprises a plurality of non-identical DNA molecules, wherein each non-identical DNA molecule is present in a population of amplification products, wherein each non-identical DNA molecule encodes for a different gRNA sequence, wherein each gRNA sequence comprises a targeting domain complementary to a eukaryotic gene, and wherein at least about 80% of the plurality of non-identical DNA molecules are each present in the amplicon library in an amount within 2x of a mean frequency for each of the non-identical DNA molecules in the library.
25. The amplicon library of claim 24, wherein each non-identical DNA molecule has a GC base content of about 30% to about 70%.
26. The amplicon library of claim 24, wherein the gRNA is a single gRNA or a dual gRNA.