

WHAT IS CLAIMED IS: CLAIMS

1. ~~A method comprising:~~

~~contacting a biological sample with an apparatus, the apparatus comprising:~~

~~(a) a flow cell body defining one or more flow channels and a plurality of wells, each flow channel of the one or more flow channels to receive a flow of fluid, each well of the plurality of wells being fluidically coupled with the corresponding flow channel of the one or more flow channels, each well of the plurality of wells defining a corresponding depth;~~

~~(b) a plurality of electrodes, each electrode of the plurality of electrodes being positioned in a corresponding well of the plurality of wells, the plurality of electrodes to effect one or both of reading or writing of a polynucleotide in the corresponding well of the plurality of wells; and~~

~~(c) an imaging assembly to capture images indicative of the nucleotide in a polynucleotide written in at least one well of the plurality of wells;~~

~~obtaining information by one or both of reading or writing of said polynucleotide;~~

~~wherein said contacting comprises contacting said biological sample with the flow cell body of said apparatus; and~~

~~wherein said information is a DNA or RNA sequence contained within said biological sample.~~

2. ~~The method of claim 1, further comprising storing said information.~~

~~3. The method of claim 1 wherein said information is selected from one or both of a DNA sequence from said biological sample and an RNA sequence from said biological sample, and wherein said polynucleotide corresponds to said one or both of said DNA sequence of said biological sample and said RNA sequence from said biological sample.~~

~~4. The method of claim 3 wherein said one or both of RNA and DNA are cell-free DNA or cell-free RNA.~~

~~5. The method of any preceding claim wherein said biological sample is selected from whole blood, serum, plasma, or combinations thereof.~~

~~6. The method of any preceding claim wherein said biological sample is selected from one or both of a virus and a bacteria.~~

~~7. The method of any preceding claim, further comprising incorporating a location indexing feature, wherein said location indexing feature is to identify the location of said information on said apparatus.~~

~~8. The method of claim 7, wherein said location indexing feature comprises a predetermined sequence affixed to said apparatus wherein said predetermined sequence is incorporated into said polynucleotide.~~

~~9. The method of any preceding claim, further comprising incorporating a source indexing feature, wherein said source indexing feature is to identify the source of said information on said apparatus.~~

~~10. The method of claim 9, wherein said source indexing feature comprises a predetermined sequence that is incorporated into said polynucleotide.~~

~~11. — A method comprising:~~

~~—— contacting a biological sample with an apparatus, the apparatus comprising:~~

~~(a) a flow cell body defining one or more flow channels and a plurality of wells, each flow channel of the one or more flow channels to receive a flow of fluid, each well of the plurality of wells being fluidically coupled with the corresponding flow channel of the one or more flow channels, each well of the plurality of wells defining a corresponding depth,~~

(b) a plurality of electrodes, each electrode of the plurality of electrodes being positioned in a corresponding well of the plurality of wells, the plurality of electrodes to effect one or both of reading and writing of a polynucleotide in the corresponding well of the plurality of wells,

(c) an imaging assembly to capture images indicative of the nucleotide in a polynucleotide written in at least one well of the plurality of wells, and

(d) one or more binding components positioned in or approximate to the plurality of wells, the one or more binding components to selectively bind with a biological cell in said biological sample;

wherein said contacting comprises contacting said biological sample with the flow cell body of said apparatus to bind said binding component with said biological cell, wherein said binding affixes said biological cell to said apparatus.

12. The method of claim 11, wherein said binding component is to bind to a preselected cell type, wherein said binding component is selective for said preselected cell type.

13. The method of claim 12, wherein said binding component binds to a surface molecule of said biological cell, wherein said surface molecule is selected from a protein, a peptide, a receptor, a sugar molecule, or combinations thereof.

14. The method of claim 12 or 13, wherein said binding component is selected from a nucleotide, a protein, a peptide, a small molecule, or combinations thereof.

15. The method of any of claims 11 through 14, wherein said information obtained from said biological cell is selected from a DNA sequence from said biological cell, an RNA sequence from said biological cell, the type of said biological cell, or combinations thereof.

16. The method of any of claims 11 through 15, claim wherein said biological sample is selected from whole blood, serum, plasma, or combinations thereof.

~~17. The method of any of claims 11 through 16, further comprising contacting said apparatus with a first solution sufficient to separate non-affixed cells from and apparatus-affixed cells.~~

~~18. The method of claim 17, further comprising contacting said apparatus with a second solution sufficient to lyse flow-cell affixed cells, wherein said lysing exposes one or both of DNA and RNA for writing of said polynucleotide contained within said apparatus-affixed cells.~~

~~19. The method of any of claims 11 through 14, further comprising binding a plurality of biological cells in said apparatus and flowing in a fluid for storage of said plurality of biological cells.~~

~~20. The method of claim 19 wherein said fluid for storage is a culture medium.~~

~~21. The method of any of claims 11 through 20, further comprising reading said information in said polynucleotide.~~

221. A method comprising:

writing a nucleotide sequence of interest;

integrating the written nucleotide sequence into a genome of a biological cell;

and

storing said biological cell in an apparatus, the apparatus comprising:

(a) a flow cell body defining one or more flow channels and a plurality of wells, each flow channel of the one or more flow channels to receive a flow of fluid, each well of the plurality of wells being fluidically coupled with the corresponding flow channel of the one or more flow channels, each well of the plurality of wells defining a corresponding depth,

(b) a plurality of electrodes, each electrode of the plurality of electrodes being positioned in a corresponding well of the plurality of wells, the plurality of electrodes to effect one or both of reading

or writing of a polynucleotide in the corresponding well of the plurality of wells, and

- (c) an imaging assembly to capture images indicative of the nucleotide in a polynucleotide written in at least one well of the plurality of wells.

23. The method of claim 22~~1~~, further comprising harvesting said nucleotide sequence of interest from said biological cell.

24~~3~~. A method of storing a health record of an individual over time, comprising obtaining biological information of said individual according to the method of ~~any of~~ claims 1 ~~through 22~~.

25~~4~~. The method of claim 22~~1~~, wherein said writing, integrating, and storing is repeated.

26. ~~A method for storing the biological information of a species, comprising obtaining the biological information of said species according to the method of any of claims 1 through 20.~~

27. ~~A method comprising:~~

~~contacting a biological sample from said individual with an apparatus, the apparatus comprising~~

- ~~(a) a flow cell body defining one or more flow channels and a plurality of wells, each flow channel of the one or more flow channels to receive a flow of fluid, each well of the plurality of wells being fluidically coupled with the corresponding flow channel of the one or more flow channels, each well of the plurality of wells defining a corresponding depth,~~
- ~~(b) a plurality of electrodes, each electrode of the plurality of electrodes being positioned in a corresponding well of the plurality of wells, the plurality of electrodes to effect one or both of reading and writing of a polynucleotide in the corresponding plurality of wells, and~~

(c) — an imaging assembly to capture images indicative of the nucleotide in a polynucleotide written in at least one well of the plurality of wells; obtaining information from said biological sample; and cataloging said information from said biological sample.

28. The method of claim 27 wherein said biological sample comprises lymphocytes from said individual.

29. The method of claim 27 or 28, wherein said cataloging comprises obtaining a clonotype profile from said individual, and wherein each clonotype comprises at least a portion of a VDJ region of a B cell receptor of said individual.

30. The method of any of claims 27 through 29, wherein said cataloging comprises obtaining a clonotype profile from said individual, and wherein each clonotype comprises at least a portion of a C gene segment from said individual.

31. The method of any of claims 26 through 28, comprising obtaining a sample of nucleic acids from lymphocytes of an individual.

32. The method of claim 30, wherein said sample comprises one or more sequences selected from a portion of a C gene segment of a B cell receptor, a VDJ region of a B cell receptor, or combinations thereof.

33. The method of claim 30 or 31, wherein said lymphocytes are lysed at a time point selected from prior to contact, during contact, after contact with said apparatus, or combinations thereof.

34. The method of any of claims 27 through 33, wherein said apparatus comprises primers to amplify a clonotype of said individual.

35. The method of any of claims 27 through 34, wherein said apparatus comprises one or more primers to amplify a region selected from a variable (V) region, a constant (C) region, a diversity (D) region, a joining (J) region, and combinations thereof.

~~36. The method of any of claims 27 through 35, wherein said cataloguing comprises recording VDJ information from immune cells of said individual.~~

~~37. The method of any of claim 36, wherein said individual has not undergone an immune system depleting event.~~

~~38. The method of any of claims 27 through 37, further comprising using the catalogued information to restore the immune system of an individual who has undergone an immune system depleting event.~~

~~39. The method of claim 38 wherein said immune system depleting event is a chemotherapy treatment.~~

~~40. The method of any preceding claim, further comprising causing electroporation or lysis of a biological cell within said flow cell body using said electrode.~~

415. A method of creating a vaccine, comprising
contacting a viral pathogen with a flow cell comprising primers that is to bind to said viral pathogen;
writing a nucleotide sequence of said viral pathogen to said flow cell; and
storing said viral pathogen to said flow cell.

426. The method of claim 415, further comprising fragmenting said viral pathogen prior to the contacting.

437. The method of claim 41 ~~or~~ 425, further comprising reading said viral pathogen from said flow cell, wherein said reading generates viral fragments, and wherein said viral fragments comprise a vaccine composition.

8. The method of claim 6, further comprising reading said viral pathogen from said flow cell, wherein said reading generates viral fragments, and wherein said viral fragments comprise a vaccine composition.