

What is claimed is:

1. A method, comprising:
generating a series of time-based clustering images for a plurality of
contiguity preserved library fragments from a genome sample, wherein each
5 time-based clustering image in the series is sequentially generated by:
introducing, to a flow cell, a respective sample including some of
the contiguity preserved library fragments, wherein the some of the
contiguity preserved library fragments are attached to a solid support
or are attached to each other;
10 initiating release of the some of the contiguity preserved library
fragments from the solid support or from each other;
amplifying the some of the contiguity preserved library
fragments to generate a plurality of respective template strands;
staining the respective template strands; and
15 imaging the respective template strands.
2. The method as defined in claim 1, further comprising assigning
each time-based clustering image in the series a temporal record of the
introduction of the respective sample including the some of the contiguity
20 preserved library fragments.
3. The method as defined in claim 2, wherein the temporal record is a
time stamp or a step number in a sequence.
- 25 4. The method as defined in one of claims 1 through 3, further
comprising using image subtraction to generate a resolved clustering image
for each of the respective samples, wherein each resolved clustering image
records a spatial location and orientation of the respective template strands
associated with a different one of the samples.
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5. The method as defined in claim 4, further comprising storing the
resolved clustering images.

6. The method as defined in claim 4 or 5, further comprising:
performing a sequencing operation on the flow cell including the
respective template strands for each of the plurality of library fragments; and
grouping sequencing reads together in different groups based on the
5 resolved clustering images.

7. The method as defined in claim 6, further comprising linking the
different groups to each of the different one of the samples based on the
resolved clustering images.

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8. The method as defined in one of claims 1 through 6, wherein:
prior to generating the series of time-based clustering images, the
method further comprises:
adding a liquid carrier to the plurality of contiguity preserved
15 library fragments to form a mixture; and
diluting the mixture with the liquid carrier to generate a
predetermined number of dilution samples to be introduced to the flow
cell; and
the introduction of the respective sample involves fluidically directing
20 one of the dilution samples to the flow cell.

9. The method as defined in claim 8, wherein the mixture including the
plurality of contiguity preserved library fragments is diluted to a predetermined
volume based on i) a volume of the flow cell as a limiting dilution and ii) the
25 predetermined number of dilution samples.

10. The method as defined in one of claims 1 through 9, wherein:
each contiguity preserved library fragment is attached to the solid
support; and
30 the release involves heating.

11. The method as defined in one of claims 1 through 9, wherein:
each of the contiguity preserved library fragments includes a first
sequence portion at a first end that hybridizes to a first primer sequence on a
surface of the flow cell; and
5 prior to amplification, the method further comprises attaching a second
sequence portion to each of the hybridized contiguity preserved library
fragments at a second end that is opposed to the first end, the second
sequence portion being identical to a second primer sequence on the surface
of the flow cell.
12. The method as defined in one of claims 1 through 9, wherein:
each contiguity preserved library fragment is attached to the solid
support;
the solid support has a plurality of adapters attached thereto; and
15 the method further comprises preparing the contiguity preserved library
fragment attached to the solid support by:
tagmenting the genome sample in the presence of the solid
support and a plurality of L-adapters, each L-adapter including a
transferred strand and a non-transferred strand, thereby generating a
20 plurality of sample fragments, whereby a respective transferred strand
is incorporated to a 5'-end of each sample fragment and a respective
non-transferred strand is hybridized to a portion of each adapter;
ligating the respective transferred strands to a respective one of
the plurality of adapters;
25 digesting the non-transferred strand using a 5'-3' exonuclease;
and
attaching a partial Y-adapter to each of the transferred strands.
13. The method as defined in claim 12, wherein ligating and digesting
30 occur in a single, one pot protocol.

14. A method, comprising:
- preparing a mixture including a plurality of contiguity preserved library fragments of a genome sample, the plurality of contiguity preserved library fragments being attached to solid supports or being attached to each other;
- 5 diluting the mixture to generate a predetermined number of dilution samples to be introduced to a flow cell; and
- generating a time-based clustering image for at least one of the contiguity preserved library fragments by:
- introducing a first of the dilution samples including some of the
- 10 contiguity preserved library fragments to the flow cell;
- initiating release of the some of the contiguity preserved library fragments from the solid support or from each other;
- amplifying the some of the contiguity preserved library fragments to generate a plurality of template strands;
- 15 staining the plurality of template strands; and
- imaging the plurality of template strands.

15. The method as defined in claim 14, wherein the mixture is diluted to a predetermined volume based on i) a volume of the flow cell as a limiting
- 20 dilution and ii) the predetermined number of dilution samples to be introduced to the flow cell.

16. The method as defined in claim 14 or 15, further comprising:
- generating a second time-based clustering image for some other of the
- 25 contiguity preserved library fragments by:
- introducing a second of the dilution samples including the some other of the contiguity preserved library fragments to the flow cell;
- initiating release of the some other of the contiguity preserved library fragments from the solid support or from each other;
- 30 amplifying the some other of the contiguity preserved library fragments to generate a second plurality of template strands;
- staining the second plurality of template strands; and

imaging the second plurality of template strands.

17. The method as defined in claim 16, further comprising generating a predetermined number of time-based clustering images for a predetermined number of the contiguity preserved library fragments by repeating the
5 introducing, the initiating release, the amplifying, the staining, and the imaging with each other of the predetermined number of dilution samples.

18. The method as defined in claim 17, further comprising assigning
10 each of the predetermined number of time-based clustering images a temporal record of the introduction of the respective dilution sample.

19. The method as defined in claim 18, wherein the temporal record is a time stamp or a step number in a sequence.
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20. The method as defined in one of claims 17 through 19, further comprising using image subtraction to generate a resolved cluster image for each of the dilution samples introduced to the flow cell, wherein each resolved cluster image records a spatial location and orientation of the
20 plurality of template strands associated with a different one of the dilution samples.

21. The method as defined in one of claims 14 through 20, wherein:
25 each contiguity preserved library fragment is attached to the solid support;
the solid support has a plurality of adapters attached thereto; and
the method further comprises preparing the contiguity preserved library fragment attached to the solid support by:

30 tagging the genome sample in the presence of the solid support and a plurality of L-adapters, each L-adapter including a transferred strand and a non-transferred strand, thereby generating a plurality of sample fragments, whereby a respective transferred strand

is incorporated to a 5'-end of each sample fragment and a respective non-transferred strand is hybridized to a portion of each adapter;
ligating the respective transferred strands to a respective one of the plurality of adapters;
5 digesting the non-transferred strand using a 5'-3' exonuclease;
and
attaching a partial Y-adapter to each of the transferred strands.

22. The method as defined in claim 21, wherein ligating and digesting
10 occur in a single, one pot protocol.

23. A system, comprising:
a flow cell receptacle;
a fluidic control system including delivery fluidics to respectively deliver
15 a dilution sample and a stain to a flow cell positioned in the flow cell
receptacle;
an illumination system positioned to illuminate the flow cell positioned
in the flow cell receptacle;
a detection system positioned to capture an image of the flow cell
20 positioned in the flow cell receptacle; and
a controller in operative communication with the fluidic control system,
illumination system, and the detection system, the controller to:
cause the delivery fluidics to introduce the dilution sample to the
flow cell positioned in the flow cell receptacle;
25 cause the delivery fluidics to introduce the stain to the flow cell
positioned in the flow cell receptacle after template strands are
generated in the flow cell positioned in the flow cell receptacle from
contiguity preserved library fragments present in the dilution sample;
cause the illumination system to illuminate the stained template
30 strands in the flow cell positioned in the flow cell receptacle; and
cause the detection system to image the illuminated, stained
template strands in the flow cell positioned in the flow cell receptacle.

24. The system as defined in claim 23, wherein the flow cell receptacle is part of a sequencer that includes a heater, wherein the controller is to:

- 5 cause the heater to initiate release of the some of the contiguity preserved library fragments from a solid support or from each other;
 cause the heater to run a thermal cycle to amplify the some of the contiguity preserved library fragments to generate the template strands.

25. The system as defined in one of claims 23 or 24, further
10 comprising:
 a first cartridge containing the dilution sample; and
 a second cartridge containing the stain.

26. The system as defined in one of claims 23 through 25, further
15 comprising an electronic storage component to store the image.

27. The system as defined in claim 23, wherein the image is a time-based clustering image in a series of time-based clustering images for a plurality of contiguity preserved library fragments from a genome sample,
20 wherein each time-based clustering image in the series is sequentially generated.