1 SRR2121770-SRR2121789

1. I've started by retrieving the PhiX genome sequence data

```
# Download PhiX genome sequence
wget ftp://igenome:G3nom3s4u@ussd-ftp.illumina.com/PhiX/Illumina/RTA/
    PhiX_Illumina_RTA.tar.gz
tar -xzvf PhiX_Illumina_RTA.tar.gz
rm README.txt PhiX_Illumina_RTA.tar.gz
```

2. Then, I ran the following bash script to generate a main SLURM file and a sub-bash script for each library

```
#!/usr/bin/bash

DATADIR=/gpfs/scratch/roberto.villegasdiaz/STAT736/homeworks/HW2/trimmomatic
FILES=($(ls -1 $DATADIR/trimm_*_forward_paired.fastq.gz | sed 's/.*\///' | sed 's
    /\_forward_paired.fastq.gz//' | sed -e 's/^trimm_//'))
COUNT=${#FILES[@]}
CPUS=20

for i in "${!FILES[@]}"; do
  LIB="${FILES[i]}"
  cat > 6.phix.lib.$((i +1)).sh <<EOF
PHIX_OUTPUT=\$1
PHIX_GENOME=\$1/../PhiX/Illumina/RTA/Sequence/Bowtie2Index/genome
TRIMMED_DATA=\$2
SLURM_NTASKS=\$3
time bowtie2 -p \$SLURM_NTASKS -x \$PHIX_GENOME -1 \$TRIMMED_DATA/trimm_${LIB}
    _forward_paired.fastq.gz -2 \$TRIMMED_DATA/trimm_${LIB}_reverse_paired.fastq.gz
     -S \$PHIX_OUTPUT/${LIB}.sam
EOF
done

cat > 6.phix.main.slurm <<EOF
#!/bin/bash
#
#SBATCH --job-name=phix
#SBATCH -N 1                                # Number of nodes, not cores
#SBATCH -t 2-00:00:00                       # Walltime
#SBATCH --array=1-${COUNT}
#SBATCH --ntasks-per-node=${CPUS}           # Number of cores
#SBATCH --output=6.phix_%a-%A-%N.log   # Output (console)
#SBATCH --partition bigmem  # Queue

module purge
module use /gpfs/shared/modulefiles_local
```

```
module use /gpfs/shared/modulefiles_local/bio
module load shared

module load bowtie2
module list

PHIX_OUTPUT=/gpfs/scratch/roberto.villegasdiaz/STAT736/homeworks/HW4/PHIX_OUT
TRIMMED_DATA=/gpfs/scratch/roberto.villegasdiaz/STAT736/homeworks/HW2/trimmomatic

date
mkdir -p \$PHIX_OUTPUT
bash 6.phix.lib.\${SLURM_ARRAY_TASK_ID}.sh \$PHIX_OUTPUT \$TRIMMED_DATA \$
    SLURM_NTASKS
date
EOF

sbatch 6.phix.main.slurm
```

3. I've submitted the following job file to the cluster:

Listing 1: SLURM file submitted to Roaring Thunder

```
#!/bin/bash
#
#SBATCH --job-name=phix
#SBATCH -N 1                                # Number of nodes, not cores
#SBATCH -t 2-00:00:00                       # Walltime
#SBATCH --array=1-12
#SBATCH --ntasks-per-node=20           # Number of cores
#SBATCH --output=6.phix_%a-%A-%N.log   # Output (console)
#SBATCH --partition bigmem  # Queue

module purge
module use /gpfs/shared/modulefiles_local
module use /gpfs/shared/modulefiles_local/bio
module load shared

module load bowtie2
module list

PHIX_OUTPUT=/gpfs/scratch/roberto.villegasdiaz/STAT736/homeworks/HW4/PHIX_OUT
TRIMMED_DATA=/gpfs/scratch/roberto.villegasdiaz/STAT736/homeworks/HW2/trimmomatic

date
mkdir -p $PHIX_OUTPUT
bash 6.phix.lib.${SLURM_ARRAY_TASK_ID}.sh $PHIX_OUTPUT $TRIMMED_DATA $SLURM_NTASKS
date
```

Above SLURM file spawns independent jobs for each library using a bash script similar to the one shown below:

Listing 2: 6.phix.lib.1.sh bash file for library SRR2121770

```
PHIX_OUTPUT=$1
PHIX_GENOME=$1/../PhiX/Illumina/RTA/Sequence/Bowtie2Index/genome
TRIMMED_DATA=$2
SLURM_NTASKS=$3
time bowtie2 -p $SLURM_NTASKS -x $PHIX_GENOME -1 $TRIMMED_DATA/
    trimm_SRR2121770_forward_paired.fastq.gz -2 $TRIMMED_DATA/
    trimm_SRR2121770_reverse_paired.fastq.gz -S $PHIX_OUTPUT/SRR2121770.sam
```

I've got the following output for each library:

```
102779602 reads; of these:
  102779602 (100.00%) were paired; of these:
    102674701 (99.90%) aligned concordantly 0 times
    104901 (0.10%) aligned concordantly exactly 1 time
    0 (0.00%) aligned concordantly >1 times
    ----
    102674701 pairs aligned concordantly 0 times; of these:
      5081 (0.00%) aligned discordantly 1 time
    ----
    102669620 pairs aligned 0 times concordantly or discordantly; of these:
      205339240 mates make up the pairs; of these:
        205336479 (100.00%) aligned 0 times
        2761 (0.00%) aligned exactly 1 time
        0 (0.00%) aligned >1 times
0.11% overall alignment rate

real 6m2.644s
user 45m26.888s
sys 74m2.157s
```

The last three lines, represent the time used by bowtie2. The table below contains all the running times:

Library	Read	Running Time
SRR2121770	1 2	6m2.644s
SRR2121771	1 2	5m15.319s

Library	Read	Running Time
SRR2121774	1 2	4m35.979s
SRR2121775	1 2	5m27.765s
SRR2121778	1 2	6m49.752s
SRR2121779	1 2	6m17.960s
SRR2121780	1 2	5m8.514s
SRR2121781	1 2	6m24.719s
SRR2121786	1 2	4m1.988s
SRR2121787	1 2	3m14.689
SRR2121788	1 2	4m19.847s
SRR2121789	1 2	4m49.481s

Table 1: `bowtie2` Running Times

Results summary (`multiqc`): PhiX Report

Results summary (`Excel`): Full Report

4. For the next step, I've downloaded the rRNA for Mus musculus (house mouse) from the NCBI's website https://www.ncbi.nlm.nih.gov/nuccore/?term=txid10090[Organism:exp]

5. Using this file (*mouse_rRNA.fa*) and the tool called bwa, I've created an index by running the following commands:

Listing 3: SLURM file submitted to Roaring Thunder

```
module load bwa/0.7.17

bwa index mouse_rRNA.fa
```

6. Then, I ran the following bash script to generate a main SLURM file and a sub-bash script for each library

```
#!/usr/bin/bash

DATADIR=/gpfs/scratch/roberto.villegasdiaz/STAT736/homeworks/HW2/trimmomatic
FILES=($(ls -1 $DATADIR/trimm_*_forward_paired.fastq.gz | sed 's/.*\///' | sed 's
    /\_forward_paired.fastq.gz//' | sed -e 's/^trimm_//'))
COUNT=${#FILES[@]}
CPUS=20

for i in "${!FILES[@]}"; do
  LIB="${FILES[i]}"
  cat > 7.bwa.lib.$((i +1)).sh <<EOF
BWA_OUTPUT=\$1
BWA_REFERENCE=\$1/../mouse_rRNA.fa
TRIMMED_DATA=\$2
SLURM_NTASKS=\$3
time bwa mem -t \$SLURM_NTASKS \$BWA_REFERENCE \$TRIMMED_DATA/trimm_${LIB}
    _forward_paired.fastq.gz \$TRIMMED_DATA/trimm_${LIB}_reverse_paired.fastq.gz |
    samtools view -@ 8 -bS -o \$BWA_OUTPUT/${LIB}.bam
time samtools flagstat -@ 8 \$BWA_OUTPUT/${LIB}.bam > \$BWA_OUTPUT/${LIB}.out
EOF
done

cat > 7.bwa.main.slurm <<EOF
#!/bin/bash
#
#SBATCH --job-name=bwa
#SBATCH -N 1                                # Number of nodes, not cores
#SBATCH -t 2-00:00:00                       # Walltime
#SBATCH --array=1-${COUNT}
#SBATCH --ntasks-per-node=${CPUS}           # Number of cores
#SBATCH --output=7.bwa_%a-%A-%N.log   # Output (console)
#SBATCH --partition bigmem  # Queue
```

```
module purge
module use /gpfs/shared/modulefiles_local
module use /gpfs/shared/modulefiles_local/bio
module load shared

module load bwa/0.7.17
module load samtools/1.9
module list

BWA_OUTPUT=/gpfs/scratch/roberto.villegasdiaz/STAT736/homeworks/HW4/BWA_OUT
TRIMMED_DATA=/gpfs/scratch/roberto.villegasdiaz/STAT736/homeworks/HW2/trimmomatic

date
mkdir -p \$BWA_OUTPUT
bash 7.bwa.lib.\${SLURM_ARRAY_TASK_ID}.sh \$BWA_OUTPUT \$TRIMMED_DATA \$
    SLURM_NTASKS
date
EOF

sbatch 7.bwa.main.slurm
```

7. I've submitted the following job file to the cluster:

Listing 4: SLURM file submitted to Roaring Thunder

```
#!/bin/bash
#
#SBATCH --job-name=bwa
#SBATCH -N 1                                  # Number of nodes, not cores
#SBATCH -t 2-00:00:00                         # Walltime
#SBATCH --array=1-12
#SBATCH --ntasks-per-node=20           # Number of cores
#SBATCH --output=7.bwa_%a-%A-%N.log   # Output (console)
#SBATCH --partition bigmem  # Queue

module purge
module use /gpfs/shared/modulefiles_local
module use /gpfs/shared/modulefiles_local/bio
module load shared

module load bwa/0.7.17
module load samtools/1.9
module list

BWA_OUTPUT=/gpfs/scratch/roberto.villegasdiaz/STAT736/homeworks/HW4/BWA_OUT
TRIMMED_DATA=/gpfs/scratch/roberto.villegasdiaz/STAT736/homeworks/HW2/trimmomatic
```

```
date
mkdir -p $BWA_OUTPUT
bash 7.bwa.lib.${SLURM_ARRAY_TASK_ID}.sh $BWA_OUTPUT $TRIMMED_DATA $SLURM_NTASKS
date
```

Above SLURM file spawns independent jobs for each library using a bash script similar to the one shown below:

Listing 5: 7.bwa.lib.1.sh bash file for library SRR2121770

```
BWA_OUTPUT=$1
BWA_REFERENCE=$1/../mouse_rRNA.fa
TRIMMED_DATA=$2
SLURM_NTASKS=$3
time bwa mem -t $SLURM_NTASKS $BWA_REFERENCE $TRIMMED_DATA/
    trimm_SRR2121770_forward_paired.fastq.gz $TRIMMED_DATA/
    trimm_SRR2121770_reverse_paired.fastq.gz | samtools view -@ 8 -bS -o $
    BWA_OUTPUT/SRR2121770.bam
time samtools flagstat -@ 8 $BWA_OUTPUT/SRR2121770.bam > $BWA_OUTPUT/SRR2121770.
    out
```

I've got the following output for each library:

```
Sat Sep 21 15:27:38 CDT 2019
[M::bwa_idx_load_from_disk] read 0 ALT contigs
[M::process] read 3965246 sequences (200000028 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (9, 31098, 19, 13)
[M::mem_pestat] skip orientation FF as there are not enough pairs
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (136, 158, 189)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (30, 295)
[M::mem_pestat] mean and std.dev: (164.02, 39.59)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 348)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (106, 348, 1448)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 4132)
[M::mem_pestat] mean and std.dev: (690.17, 632.41)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 5474)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (71, 105, 343)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 887)
[M::mem_pestat] mean and std.dev: (119.73, 85.02)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 1159)
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3965246 reads in 101.524 CPU sec, 10.166 real sec
[M::process] read 3966444 sequences (200000067 bp)...
```

```
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (8, 30333, 38, 13)
[M::mem_pestat] skip orientation FF as there are not enough pairs
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 188)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (29, 294)
[M::mem_pestat] mean and std.dev: (163.19, 39.38)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 347)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (57, 220, 745)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2121)
[M::mem_pestat] mean and std.dev: (338.35, 393.76)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2809)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (78, 103, 1243)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3573)
[M::mem_pestat] mean and std.dev: (391.33, 448.03)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4738)
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3966444 reads in 87.554 CPU sec, 4.883 real sec
[M::process] read 3975014 sequences (200000076 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (13, 28610, 26, 15)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (41, 111, 203)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 527)
[M::mem_pestat] mean and std.dev: (107.33, 71.68)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 689)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 186)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (33, 288)
[M::mem_pestat] mean and std.dev: (162.25, 38.38)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 339)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (37, 257, 873)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2545)
[M::mem_pestat] mean and std.dev: (285.95, 307.29)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 3381)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (110, 151, 611)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 1613)
[M::mem_pestat] mean and std.dev: (260.31, 303.40)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2114)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
```

```
[M::mem_process_seqs] Processed 3975014 reads in 85.133 CPU sec, 4.384 real sec
[M::process] read 3984106 sequences (200000025 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (12, 25966, 21, 9)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (101, 239, 715)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 1943)
[M::mem_pestat] mean and std.dev: (330.91, 383.08)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2557)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 156, 187)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (31, 291)
[M::mem_pestat] mean and std.dev: (162.38, 38.67)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 343)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (123, 747, 1700)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 4854)
[M::mem_pestat] mean and std.dev: (737.44, 1080.43)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 6431)
[M::mem_pestat] skip orientation RR as there are not enough pairs
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_process_seqs] Processed 3984106 reads in 84.960 CPU sec, 5.162 real sec
[M::process] read 3958704 sequences (200000081 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (15, 32848, 37, 10)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (128, 265, 4438)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 13058)
[M::mem_pestat] mean and std.dev: (2059.27, 2298.91)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 17368)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 189)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (27, 297)
[M::mem_pestat] mean and std.dev: (163.84, 40.05)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 351)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (77, 233, 1738)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 5060)
[M::mem_pestat] mean and std.dev: (960.31, 1415.73)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 6721)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (62, 124, 283)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 725)
[M::mem_pestat] mean and std.dev: (142.67, 107.09)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 946)
[M::mem_pestat] skip orientation FF
```

```
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3958704 reads in 91.954 CPU sec, 5.744 real sec
[M::process] read 3959980 sequences (200000014 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (12, 32363, 23, 12)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (83, 107, 4924)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 14606)
[M::mem_pestat] mean and std.dev: (1634.83, 2211.12)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 19447)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 188)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (29, 294)
[M::mem_pestat] mean and std.dev: (163.30, 39.54)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 347)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (127, 678, 1213)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3385)
[M::mem_pestat] mean and std.dev: (511.00, 433.32)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4471)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (99, 113, 158)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 276)
[M::mem_pestat] mean and std.dev: (119.82, 51.54)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 335)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3959980 reads in 89.107 CPU sec, 4.780 real sec
[M::process] read 3961288 sequences (200000038 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (7, 32267, 22, 6)
[M::mem_pestat] skip orientation FF as there are not enough pairs
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 188)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (29, 294)
[M::mem_pestat] mean and std.dev: (163.40, 39.79)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 347)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (38, 192, 1169)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3431)
[M::mem_pestat] mean and std.dev: (468.90, 574.57)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4562)
[M::mem_pestat] skip orientation RR as there are not enough pairs
[M::mem_pestat] skip orientation RF
[M::mem_process_seqs] Processed 3961288 reads in 89.059 CPU sec, 4.837 real sec
```

```
[M::process] read 3966212 sequences (200000054 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (12, 30577, 28, 17)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (61, 72, 683)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 1927)
[M::mem_pestat] mean and std.dev: (296.42, 434.38)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2549)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 188)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (29, 294)
[M::mem_pestat] mean and std.dev: (163.37, 39.53)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 347)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (117, 377, 1350)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3816)
[M::mem_pestat] mean and std.dev: (590.69, 698.20)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 5049)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (107, 193, 3813)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 11225)
[M::mem_pestat] mean and std.dev: (1345.41, 1920.61)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 14931)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3966212 reads in 83.593 CPU sec, 4.549 real sec
[M::process] read 3963490 sequences (200000040 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (14, 32618, 30, 9)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (70, 125, 571)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 1573)
[M::mem_pestat] mean and std.dev: (229.75, 338.47)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2074)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 187)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (31, 291)
[M::mem_pestat] mean and std.dev: (162.81, 39.28)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 343)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (35, 190, 300)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 830)
[M::mem_pestat] mean and std.dev: (154.44, 131.38)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 1095)
[M::mem_pestat] skip orientation RR as there are not enough pairs
[M::mem_pestat] skip orientation FF
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[M::mem_pestat] skip orientation RF
[M::mem_process_seqs] Processed 3963490 reads in 78.902 CPU sec, 4.614 real sec
[M::process] read 3967878 sequences (200000041 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (14, 30737, 20, 12)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (97, 191, 1292)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3682)
[M::mem_pestat] mean and std.dev: (448.33, 544.05)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4877)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 187)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (31, 291)
[M::mem_pestat] mean and std.dev: (162.70, 38.92)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 343)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (75, 339, 1347)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3891)
[M::mem_pestat] mean and std.dev: (629.95, 885.03)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 5163)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (94, 122, 980)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2752)
[M::mem_pestat] mean and std.dev: (340.82, 420.74)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 3638)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3967878 reads in 96.103 CPU sec, 5.141 real sec
[M::process] read 3969788 sequences (200000080 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (9, 29345, 30, 8)
[M::mem_pestat] skip orientation FF as there are not enough pairs
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 156, 185)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (35, 285)
[M::mem_pestat] mean and std.dev: (161.27, 37.94)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 335)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (90, 281, 1207)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3441)
[M::mem_pestat] mean and std.dev: (586.74, 755.00)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4558)
[M::mem_pestat] skip orientation RR as there are not enough pairs
[M::mem_pestat] skip orientation RF
[M::mem_process_seqs] Processed 3969788 reads in 85.778 CPU sec, 5.406 real sec
[M::process] read 3971994 sequences (200000073 bp)...
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[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (8, 29540, 22, 12)
[M::mem_pestat] skip orientation FF as there are not enough pairs
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (134, 155, 186)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (30, 290)
[M::mem_pestat] mean and std.dev: (161.60, 38.65)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 342)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (69, 286, 1041)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2985)
[M::mem_pestat] mean and std.dev: (438.21, 670.65)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 3957)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (76, 118, 324)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 820)
[M::mem_pestat] mean and std.dev: (117.50, 76.27)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 1068)
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3971994 reads in 88.552 CPU sec, 5.140 real sec
[M::process] read 3957362 sequences (200000040 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (14, 33634, 25, 22)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (90, 238, 460)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 1200)
[M::mem_pestat] mean and std.dev: (222.00, 187.11)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 1570)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 158, 189)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (27, 297)
[M::mem_pestat] mean and std.dev: (163.90, 40.09)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 351)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (67, 137, 602)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 1672)
[M::mem_pestat] mean and std.dev: (193.24, 220.08)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2207)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (97, 722, 1142)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3232)
[M::mem_pestat] mean and std.dev: (603.50, 709.90)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4277)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
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[M::mem_process_seqs] Processed 3957362 reads in 90.727 CPU sec, 5.706 real sec
[M::process] read 3956502 sequences (200000012 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (24, 33717, 30, 16)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (80, 193, 1296)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3728)
[M::mem_pestat] mean and std.dev: (268.65, 377.52)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4944)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 189)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (27, 297)
[M::mem_pestat] mean and std.dev: (164.11, 40.46)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 351)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (95, 207, 608)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 1634)
[M::mem_pestat] mean and std.dev: (295.59, 309.65)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2147)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (122, 211, 1411)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3989)
[M::mem_pestat] mean and std.dev: (320.38, 436.55)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 5278)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3956502 reads in 86.750 CPU sec, 4.805 real sec
[M::process] read 3957030 sequences (200000038 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (9, 33233, 37, 11)
[M::mem_pestat] skip orientation FF as there are not enough pairs
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 158, 189)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (27, 297)
[M::mem_pestat] mean and std.dev: (163.92, 40.23)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 351)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (88, 304, 1111)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3157)
[M::mem_pestat] mean and std.dev: (469.79, 559.66)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4180)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (107, 185, 1192)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3362)
[M::mem_pestat] mean and std.dev: (444.20, 557.95)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4447)
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[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3957030 reads in 97.077 CPU sec, 5.046 real sec
[M::process] read 3959210 sequences (200000037 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (9, 33408, 35, 21)
[M::mem_pestat] skip orientation FF as there are not enough pairs
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 188)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (29, 294)
[M::mem_pestat] mean and std.dev: (163.22, 39.29)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 347)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (93, 199, 696)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 1902)
[M::mem_pestat] mean and std.dev: (389.91, 427.60)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2505)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (55, 134, 435)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 1195)
[M::mem_pestat] mean and std.dev: (176.06, 245.86)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 1575)
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3959210 reads in 97.726 CPU sec, 5.473 real sec
[M::process] read 3961370 sequences (200000076 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (19, 33076, 24, 19)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (90, 102, 501)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 1323)
[M::mem_pestat] mean and std.dev: (133.53, 121.74)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 1734)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 187)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (31, 291)
[M::mem_pestat] mean and std.dev: (162.69, 39.05)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 343)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (128, 244, 930)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2534)
[M::mem_pestat] mean and std.dev: (351.95, 412.44)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 3336)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (79, 136, 291)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 715)
[M::mem_pestat] mean and std.dev: (120.07, 76.44)
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[M::mem_pestat] low and high boundaries for proper pairs: (1, 927)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3961370 reads in 97.603 CPU sec, 5.810 real sec
[M::process] read 3959036 sequences (200000079 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (17, 33297, 28, 15)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (68, 98, 223)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 533)
[M::mem_pestat] mean and std.dev: (108.87, 62.57)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 688)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 187)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (31, 291)
[M::mem_pestat] mean and std.dev: (162.72, 39.12)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 343)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (59, 178, 915)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2627)
[M::mem_pestat] mean and std.dev: (356.12, 519.46)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 3483)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (168, 307, 1284)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3516)
[M::mem_pestat] mean and std.dev: (684.29, 759.55)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4632)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3959036 reads in 98.858 CPU sec, 5.983 real sec
[M::process] read 3951930 sequences (200000031 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (14, 33797, 26, 9)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (83, 197, 1476)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 4262)
[M::mem_pestat] mean and std.dev: (459.23, 626.07)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 5655)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (136, 157, 190)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (28, 298)
[M::mem_pestat] mean and std.dev: (164.20, 40.35)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 352)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (140, 541, 1134)
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[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3122)
[M::mem_pestat] mean and std.dev: (576.61, 546.02)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4116)
[M::mem_pestat] skip orientation RR as there are not enough pairs
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_process_seqs] Processed 3951930 reads in 96.206 CPU sec, 4.937 real sec
[M::process] read 3952464 sequences (200000087 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (18, 34306, 33, 17)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (86, 133, 232)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 524)
[M::mem_pestat] mean and std.dev: (126.20, 58.90)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 670)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (136, 158, 189)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (30, 295)
[M::mem_pestat] mean and std.dev: (164.27, 40.27)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 348)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (146, 277, 1017)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2759)
[M::mem_pestat] mean and std.dev: (452.80, 509.19)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 3630)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (110, 162, 1910)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 5510)
[M::mem_pestat] mean and std.dev: (1302.59, 1720.34)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 8184)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3952464 reads in 103.442 CPU sec, 5.795 real sec
[M::process] read 3951684 sequences (200000055 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (15, 34195, 34, 13)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (103, 162, 591)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 1567)
[M::mem_pestat] mean and std.dev: (283.14, 331.98)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2055)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 189)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (27, 297)
[M::mem_pestat] mean and std.dev: (163.96, 40.29)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 351)
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[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (79, 342, 880)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2482)
[M::mem_pestat] mean and std.dev: (425.77, 475.03)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 3283)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (60, 82, 185)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 435)
[M::mem_pestat] mean and std.dev: (84.73, 42.32)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 560)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3951684 reads in 88.171 CPU sec, 5.610 real sec
[M::process] read 3953078 sequences (200000093 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (16, 33952, 21, 12)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (93, 214, 1420)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 4074)
[M::mem_pestat] mean and std.dev: (262.46, 353.79)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 5401)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 158, 188)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (29, 294)
[M::mem_pestat] mean and std.dev: (163.42, 39.67)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 347)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (62, 220, 863)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2465)
[M::mem_pestat] mean and std.dev: (278.61, 303.78)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 3266)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (68, 443, 3124)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 9236)
[M::mem_pestat] mean and std.dev: (1511.00, 1932.15)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 12292)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3953078 reads in 90.864 CPU sec, 5.519 real sec
[M::process] read 3953900 sequences (200000010 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (16, 33339, 41, 19)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (62, 141, 4028)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 11960)
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[M::mem_pestat] mean and std.dev: (1545.94, 2179.40)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 15926)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 189)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (27, 297)
[M::mem_pestat] mean and std.dev: (163.55, 40.07)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 351)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (44, 172, 802)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2318)
[M::mem_pestat] mean and std.dev: (378.36, 488.76)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 3076)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (84, 147, 271)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 645)
[M::mem_pestat] mean and std.dev: (147.06, 83.67)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 832)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3953900 reads in 90.472 CPU sec, 5.977 real sec
[M::process] read 3953652 sequences (200000010 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (9, 33874, 24, 16)
[M::mem_pestat] skip orientation FF as there are not enough pairs
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 188)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (29, 294)
[M::mem_pestat] mean and std.dev: (163.25, 39.63)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 347)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (54, 285, 967)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2793)
[M::mem_pestat] mean and std.dev: (470.29, 462.10)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 3706)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (127, 166, 1298)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3640)
[M::mem_pestat] mean and std.dev: (429.43, 599.65)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4811)
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3953652 reads in 90.430 CPU sec, 5.226 real sec
[M::process] read 3953368 sequences (200000077 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (19, 33519, 37, 13)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
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[M::mem_pestat] (25, 50, 75) percentile: (69, 118, 211)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 495)
[M::mem_pestat] mean and std.dev: (115.12, 70.67)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 637)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 188)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (29, 294)
[M::mem_pestat] mean and std.dev: (162.90, 39.54)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 347)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (98, 218, 832)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2300)
[M::mem_pestat] mean and std.dev: (376.91, 386.50)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 3034)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (99, 136, 3505)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 10317)
[M::mem_pestat] mean and std.dev: (1223.92, 2072.72)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 13723)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3953368 reads in 93.342 CPU sec, 6.092 real sec
[M::process] read 3956964 sequences (200000085 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (6, 32118, 31, 12)
[M::mem_pestat] skip orientation FF as there are not enough pairs
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 188)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (29, 294)
[M::mem_pestat] mean and std.dev: (163.23, 40.01)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 347)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (89, 133, 842)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2348)
[M::mem_pestat] mean and std.dev: (415.83, 520.66)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 3101)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (96, 134, 737)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2019)
[M::mem_pestat] mean and std.dev: (263.36, 328.51)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2660)
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3956964 reads in 106.285 CPU sec, 5.826 real sec
[M::process] read 3959300 sequences (200000008 bp)...
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[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (18, 31645, 23, 12)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (92, 222, 1393)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3995)
[M::mem_pestat] mean and std.dev: (883.11, 1136.10)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 5428)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 187)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (31, 291)
[M::mem_pestat] mean and std.dev: (162.67, 39.14)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 343)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (93, 165, 994)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2796)
[M::mem_pestat] mean and std.dev: (501.90, 671.69)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 3697)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (67, 85, 803)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2275)
[M::mem_pestat] mean and std.dev: (260.55, 414.17)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 3011)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3959300 reads in 88.409 CPU sec, 5.162 real sec
[M::process] read 3959758 sequences (200000072 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (12, 31274, 25, 11)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (86, 101, 129)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 215)
[M::mem_pestat] mean and std.dev: (89.50, 19.67)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 258)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 188)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (29, 294)
[M::mem_pestat] mean and std.dev: (162.87, 39.49)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 347)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (74, 293, 1120)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3212)
[M::mem_pestat] mean and std.dev: (546.35, 651.23)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4258)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (83, 94, 141)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 257)
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[M::mem_pestat] mean and std.dev: (84.78, 31.76)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 315)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3959758 reads in 98.641 CPU sec, 5.251 real sec
[M::process] read 3947806 sequences (200000063 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (13, 35038, 28, 11)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (77, 135, 1264)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3638)
[M::mem_pestat] mean and std.dev: (464.25, 716.98)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4825)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 189)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (27, 297)
[M::mem_pestat] mean and std.dev: (163.63, 40.44)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 351)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (142, 240, 1336)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3724)
[M::mem_pestat] mean and std.dev: (484.80, 605.07)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4918)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (97, 140, 1853)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 5365)
[M::mem_pestat] mean and std.dev: (1029.82, 1653.96)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 7646)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3947806 reads in 100.011 CPU sec, 6.469 real sec
[M::process] read 3947870 sequences (200000026 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (12, 35159, 37, 13)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (75, 102, 136)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 258)
[M::mem_pestat] mean and std.dev: (100.00, 41.09)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 319)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 188)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (29, 294)
[M::mem_pestat] mean and std.dev: (163.25, 39.90)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 347)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
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[M::mem_pestat] (25, 50, 75) percentile: (21, 60, 712)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2094)
[M::mem_pestat] mean and std.dev: (251.24, 445.70)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2785)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (147, 405, 1402)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3912)
[M::mem_pestat] mean and std.dev: (762.77, 657.76)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 5167)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3947870 reads in 85.747 CPU sec, 4.530 real sec
[M::process] read 3949958 sequences (200000061 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (6, 35348, 29, 15)
[M::mem_pestat] skip orientation FF as there are not enough pairs
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 188)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (29, 294)
[M::mem_pestat] mean and std.dev: (163.24, 39.84)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 347)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (170, 325, 912)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2396)
[M::mem_pestat] mean and std.dev: (490.52, 480.09)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 3138)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (70, 163, 3244)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 9592)
[M::mem_pestat] mean and std.dev: (1425.87, 2121.61)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 12766)
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3949958 reads in 89.499 CPU sec, 4.689 real sec
[M::process] read 3951434 sequences (200000088 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (11, 34899, 22, 10)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (114, 270, 4084)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 12024)
[M::mem_pestat] mean and std.dev: (1438.36, 1883.39)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 15994)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 188)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (29, 294)
[M::mem_pestat] mean and std.dev: (162.84, 39.67)
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[M::mem_pestat] low and high boundaries for proper pairs: (1, 347)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (71, 545, 799)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2255)
[M::mem_pestat] mean and std.dev: (502.10, 463.09)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2983)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (63, 144, 160)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 354)
[M::mem_pestat] mean and std.dev: (99.88, 47.66)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 451)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3951434 reads in 88.444 CPU sec, 4.935 real sec
[M::process] read 3951178 sequences (200000052 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (8, 35123, 29, 16)
[M::mem_pestat] skip orientation FF as there are not enough pairs
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 156, 187)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (31, 291)
[M::mem_pestat] mean and std.dev: (162.24, 39.15)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 343)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (34, 126, 654)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 1894)
[M::mem_pestat] mean and std.dev: (252.15, 340.81)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2514)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (83, 193, 1299)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3731)
[M::mem_pestat] mean and std.dev: (285.69, 412.26)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4947)
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3951178 reads in 96.996 CPU sec, 5.178 real sec
[M::process] read 3951268 sequences (200000047 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (16, 35176, 43, 21)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (42, 94, 149)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 363)
[M::mem_pestat] mean and std.dev: (78.93, 49.68)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 470)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 156, 187)
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[M::mem_pestat] low and high boundaries for computing mean and std.dev: (31, 291)
[M::mem_pestat] mean and std.dev: (162.23, 39.20)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 343)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (61, 181, 1040)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2998)
[M::mem_pestat] mean and std.dev: (434.85, 560.77)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 3977)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (62, 96, 241)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 599)
[M::mem_pestat] mean and std.dev: (91.06, 59.68)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 778)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3951268 reads in 103.486 CPU sec, 5.434 real sec
[M::process] read 3951556 sequences (200000083 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (16, 34544, 27, 18)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (90, 121, 231)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 513)
[M::mem_pestat] mean and std.dev: (137.20, 83.97)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 654)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (134, 156, 187)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (28, 293)
[M::mem_pestat] mean and std.dev: (161.77, 38.94)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 346)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (75, 166, 937)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2661)
[M::mem_pestat] mean and std.dev: (310.96, 381.85)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 3523)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (54, 94, 716)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2040)
[M::mem_pestat] mean and std.dev: (121.50, 172.11)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2702)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3951556 reads in 96.414 CPU sec, 5.632 real sec
[M::process] read 3956144 sequences (200000058 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (15, 32929, 17, 14)
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[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (94, 111, 1579)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 4549)
[M::mem_pestat] mean and std.dev: (558.21, 875.38)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 6034)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (134, 156, 187)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (28, 293)
[M::mem_pestat] mean and std.dev: (162.27, 39.19)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 346)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (42, 144, 638)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 1830)
[M::mem_pestat] mean and std.dev: (189.93, 255.16)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2426)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (96, 189, 1338)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3822)
[M::mem_pestat] mean and std.dev: (372.92, 502.79)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 5064)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3956144 reads in 96.421 CPU sec, 5.147 real sec
[M::process] read 3956470 sequences (200000081 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (14, 33170, 30, 10)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (92, 130, 201)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 419)
[M::mem_pestat] mean and std.dev: (121.42, 56.86)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 528)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (134, 155, 186)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (30, 290)
[M::mem_pestat] mean and std.dev: (161.63, 38.82)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 342)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (61, 133, 333)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 877)
[M::mem_pestat] mean and std.dev: (172.27, 198.94)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 1149)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (66, 234, 261)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 651)
[M::mem_pestat] mean and std.dev: (135.50, 86.07)
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[M::mem_pestat] low and high boundaries for proper pairs: (1, 846)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3956470 reads in 88.008 CPU sec, 4.616 real sec
[M::process] read 3955254 sequences (200000082 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (14, 33442, 25, 17)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (38, 75, 218)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 578)
[M::mem_pestat] mean and std.dev: (91.67, 90.09)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 758)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 156, 186)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (33, 288)
[M::mem_pestat] mean and std.dev: (161.72, 38.44)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 339)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (77, 221, 1251)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3599)
[M::mem_pestat] mean and std.dev: (402.57, 525.41)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4773)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (91, 152, 190)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 388)
[M::mem_pestat] mean and std.dev: (111.64, 49.84)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 487)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3955254 reads in 83.348 CPU sec, 4.482 real sec
[M::process] read 3956514 sequences (200000068 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (17, 32815, 35, 17)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (87, 119, 320)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 786)
[M::mem_pestat] mean and std.dev: (134.21, 84.03)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 1019)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (134, 156, 186)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (30, 290)
[M::mem_pestat] mean and std.dev: (161.72, 38.59)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 342)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (118, 151, 537)
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[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 1375)
[M::mem_pestat] mean and std.dev: (314.57, 311.80)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 1794)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (115, 168, 307)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 691)
[M::mem_pestat] mean and std.dev: (149.36, 62.60)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 883)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3956514 reads in 96.597 CPU sec, 5.051 real sec
[M::process] read 3962036 sequences (200000034 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (11, 30897, 35, 10)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (78, 109, 143)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 273)
[M::mem_pestat] mean and std.dev: (97.30, 57.41)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 338)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 156, 187)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (31, 291)
[M::mem_pestat] mean and std.dev: (161.96, 38.75)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 343)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (125, 303, 1289)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3617)
[M::mem_pestat] mean and std.dev: (545.38, 557.06)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4781)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (66, 204, 1343)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3897)
[M::mem_pestat] mean and std.dev: (723.44, 1048.29)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 5174)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3962036 reads in 82.371 CPU sec, 4.270 real sec
[M::process] read 3952938 sequences (200000006 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (20, 34298, 37, 14)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (87, 117, 225)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 501)
[M::mem_pestat] mean and std.dev: (100.38, 51.83)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 639)
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[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 188)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (29, 294)
[M::mem_pestat] mean and std.dev: (163.31, 39.84)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 347)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (69, 188, 1104)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3174)
[M::mem_pestat] mean and std.dev: (427.74, 532.79)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4209)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (79, 228, 1285)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3697)
[M::mem_pestat] mean and std.dev: (307.00, 381.99)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4903)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3952938 reads in 95.078 CPU sec, 5.030 real sec
[M::process] read 3948220 sequences (200000083 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (14, 35557, 34, 18)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (102, 140, 1294)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3678)
[M::mem_pestat] mean and std.dev: (425.75, 637.87)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4870)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (136, 158, 190)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (28, 298)
[M::mem_pestat] mean and std.dev: (164.59, 40.57)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 352)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (69, 234, 560)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 1542)
[M::mem_pestat] mean and std.dev: (275.90, 292.52)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2033)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (71, 141, 1247)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3599)
[M::mem_pestat] mean and std.dev: (335.13, 451.90)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4775)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3948220 reads in 88.282 CPU sec, 5.134 real sec
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[M::process] read 3947814 sequences (200000003 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (10, 35526, 27, 14)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (82, 201, 716)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 1984)
[M::mem_pestat] mean and std.dev: (321.33, 389.31)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2618)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 189)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (27, 297)
[M::mem_pestat] mean and std.dev: (163.77, 40.25)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 351)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (90, 195, 909)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2547)
[M::mem_pestat] mean and std.dev: (396.60, 420.22)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 3366)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (39, 88, 240)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 642)
[M::mem_pestat] mean and std.dev: (116.08, 123.81)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 843)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3947814 reads in 90.639 CPU sec, 4.675 real sec
[M::process] read 3949628 sequences (200000019 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (13, 35166, 33, 18)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (84, 5021, 6013)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 17871)
[M::mem_pestat] mean and std.dev: (3115.31, 2844.22)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 23800)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 189)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (27, 297)
[M::mem_pestat] mean and std.dev: (163.57, 40.27)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 351)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (58, 94, 295)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 769)
[M::mem_pestat] mean and std.dev: (132.45, 140.45)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 1006)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (71, 109, 222)
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[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 524)
[M::mem_pestat] mean and std.dev: (111.00, 72.62)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 675)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3949628 reads in 88.720 CPU sec, 4.475 real sec
[M::process] read 3950080 sequences (200000019 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (21, 35208, 32, 18)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (93, 110, 1061)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2997)
[M::mem_pestat] mean and std.dev: (290.22, 500.22)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 3965)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 188)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (29, 294)
[M::mem_pestat] mean and std.dev: (163.18, 39.68)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 347)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (54, 187, 270)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 702)
[M::mem_pestat] mean and std.dev: (153.48, 110.45)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 918)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (74, 110, 2428)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 7136)
[M::mem_pestat] mean and std.dev: (1205.44, 1766.94)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 9490)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3950080 reads in 74.828 CPU sec, 3.841 real sec
[M::process] read 3948658 sequences (200000071 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (12, 35584, 30, 12)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (117, 211, 506)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 1284)
[M::mem_pestat] mean and std.dev: (192.30, 143.76)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 1673)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 156, 188)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (29, 294)
[M::mem_pestat] mean and std.dev: (162.60, 39.77)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 347)
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[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (119, 530, 1435)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 4067)
[M::mem_pestat] mean and std.dev: (697.61, 761.20)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 5383)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (68, 95, 202)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 470)
[M::mem_pestat] mean and std.dev: (84.90, 48.35)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 604)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3948658 reads in 78.099 CPU sec, 3.968 real sec
[M::process] read 3950410 sequences (200000031 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (9, 34752, 39, 17)
[M::mem_pestat] skip orientation FF as there are not enough pairs
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 187)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (31, 291)
[M::mem_pestat] mean and std.dev: (162.76, 39.23)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 343)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (73, 184, 630)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 1744)
[M::mem_pestat] mean and std.dev: (285.86, 290.42)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2301)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (46, 87, 1443)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 4237)
[M::mem_pestat] mean and std.dev: (519.25, 980.32)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 5634)
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3950410 reads in 97.169 CPU sec, 4.852 real sec
[M::process] read 3953276 sequences (200000017 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (13, 33870, 30, 20)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (60, 77, 1195)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3465)
[M::mem_pestat] mean and std.dev: (174.00, 323.76)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4600)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 157, 187)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (31, 291)
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[M::mem_pestat] mean and std.dev: (162.45, 39.18)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 343)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (24, 127, 717)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 2103)
[M::mem_pestat] mean and std.dev: (182.24, 249.45)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2796)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (105, 168, 1173)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3309)
[M::mem_pestat] mean and std.dev: (366.65, 425.81)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4377)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3953276 reads in 100.877 CPU sec, 5.326 real sec
[M::process] read 3953328 sequences (200000012 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (14, 33800, 28, 12)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (55, 141, 1899)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 5587)
[M::mem_pestat] mean and std.dev: (1197.07, 1700.03)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 7997)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 156, 187)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (31, 291)
[M::mem_pestat] mean and std.dev: (162.28, 39.30)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 343)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (50, 272, 1057)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3071)
[M::mem_pestat] mean and std.dev: (503.88, 647.44)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4078)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (43, 69, 157)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 385)
[M::mem_pestat] mean and std.dev: (66.10, 38.99)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 499)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3953328 reads in 88.990 CPU sec, 4.501 real sec
[M::process] read 3956052 sequences (200000061 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (19, 33034, 31, 17)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
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[M::mem_pestat] (25, 50, 75) percentile: (72, 81, 342)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 882)
[M::mem_pestat] mean and std.dev: (141.75, 185.44)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 1152)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 156, 187)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (31, 291)
[M::mem_pestat] mean and std.dev: (162.42, 39.42)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 343)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (95, 251, 582)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 1556)
[M::mem_pestat] mean and std.dev: (291.81, 288.88)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 2043)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (75, 207, 1255)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3615)
[M::mem_pestat] mean and std.dev: (609.35, 919.11)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4795)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3956052 reads in 85.537 CPU sec, 4.303 real sec
[M::process] read 3957364 sequences (200000066 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (19, 32684, 40, 18)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (49, 66, 130)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 292)
[M::mem_pestat] mean and std.dev: (69.20, 33.40)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 373)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 156, 187)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (31, 291)
[M::mem_pestat] mean and std.dev: (162.27, 38.74)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 343)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (38, 153, 315)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 869)
[M::mem_pestat] mean and std.dev: (131.97, 131.69)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 1146)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (78, 245, 3562)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 10530)
[M::mem_pestat] mean and std.dev: (1385.44, 1846.58)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 14014)
```

```
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3957364 reads in 86.681 CPU sec, 4.490 real sec
[M::process] read 3747196 sequences (189339410 bp)...
[M::mem_pestat] # candidate unique pairs for (FF, FR, RF, RR): (12, 30487, 33, 20)
[M::mem_pestat] analyzing insert size distribution for orientation FF...
[M::mem_pestat] (25, 50, 75) percentile: (54, 98, 192)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 468)
[M::mem_pestat] mean and std.dev: (99.55, 72.98)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 606)
[M::mem_pestat] analyzing insert size distribution for orientation FR...
[M::mem_pestat] (25, 50, 75) percentile: (135, 156, 188)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (29, 294)
[M::mem_pestat] mean and std.dev: (162.76, 39.40)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 347)
[M::mem_pestat] analyzing insert size distribution for orientation RF...
[M::mem_pestat] (25, 50, 75) percentile: (104, 302, 1228)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3476)
[M::mem_pestat] mean and std.dev: (489.24, 596.18)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4600)
[M::mem_pestat] analyzing insert size distribution for orientation RR...
[M::mem_pestat] (25, 50, 75) percentile: (64, 83, 1260)
[M::mem_pestat] low and high boundaries for computing mean and std.dev: (1, 3652)
[M::mem_pestat] mean and std.dev: (434.67, 783.93)
[M::mem_pestat] low and high boundaries for proper pairs: (1, 4848)
[M::mem_pestat] skip orientation FF
[M::mem_pestat] skip orientation RF
[M::mem_pestat] skip orientation RR
[M::mem_process_seqs] Processed 3747196 reads in 81.072 CPU sec, 4.684 real sec
[main] Version: 0.7.17-r1188
[main] CMD: bwa mem -t 20 /gpfs/scratch/roberto.villegasdiaz/STAT736/homeworks/HW4/BWA
[main] Real time: 480.134 sec; CPU: 5042.592 sec

real 8m0.331s
user 98m43.744s
sys 8m58.295s
```

The last three lines, represent the time used by `bwa`. The table below contains all the running times:

Library	Read	Running Time
SRR2121770	1 2	8m0.331s
SRR2121771	1 2	6m36.005s
SRR2121774	1 2	5m32.758s
SRR2121775	1 2	7m14.134s
SRR2121778	1 2	8m41.481s
SRR2121779	1 2	7m51.673s
SRR2121780	1 2	6m36.293s
SRR2121781	1 2	7m52.245s
SRR2121786	1 2	4m51.282s
SRR2121787	1 2	3m44.530s
SRR2121788	1 2	5m1.720s
SRR2121789	1 2	5m38.711s

Table 2: `bwa` Running Times

Also, for each library we have a `samtools` output, that looks similar to:

```
205559289 + 0 in total (QC-passed reads + QC-failed reads)
0 + 0 secondary
85 + 0 supplementary
0 + 0 duplicates
4265179 + 0 mapped (2.07% : N/A)
205559204 + 0 paired in sequencing
102779602 + 0 read1
```

```
102779602 + 0 read2
4151684 + 0 properly paired (2.02% : N/A)
4187608 + 0 with itself and mate mapped
77486 + 0 singletons (0.04% : N/A)
4222 + 0 with mate mapped to a different chr
1026 + 0 with mate mapped to a different chr (mapQ>=5)
```

Results summary (multiqc): BWA Report
Results summary (Excel): Full Report