

# Package ‘RBedMethyl’

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**Type** Package

**Title** Disk-backed Representation of ONT bedMethyl Files

**Version** 0.99.1

**Description** Bioconductor-native infrastructure for handling large nanoporetech modkit bedMethyl pileup files from ONT data using HDF5Array and DelayedArray.

**URL** <https://github.com/CMG-UA/RBedMethyl>

**BugReports** <https://github.com/CMG-UA/RBedMethyl/issues>

**License** GPL (>= 2)

**Encoding** UTF-8

**Roxygen** list(markdown = TRUE)

**RoxygenNote** 7.3.3

**VignetteBuilder** knitr

**biocViews** DNAMethylation, DifferentialMethylation, Epigenetics, Infrastructure, DataImport, Software

**LazyData** false

**Imports** methods, HDF5Array, rhdf5, DelayedArray, DelayedMatrixStats, SummarizedExperiment, bsseq, GenomicRanges, S4Vectors, IRanges, data.table

**Suggests** BiocStyle, knitr, rmarkdown, testthat

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|                 |  |
|-----------------|--|
| bedMethylFields | <i>List retrievable bedMethyl fields</i> |
|-----------------|--|

---

### Description

Returns a data.frame describing retrievable bedMethyl fields and their types.

### Usage

```
bedMethylFields()
```

### Value

A data.frame with columns field, type, and description.

### Examples

```
bedMethylFields()
```

---

|                                |                                      |
|--------------------------------|--------------------------------------|
| beta,RBedMethyl,missing-method | <i>Per-site methylation fraction</i> |
|--------------------------------|--------------------------------------|

---

### Description

Compute per-site methylation fraction for an RBedMethyl object. Requires the mod\_reads assay to be loaded.

### Usage

```
## S4 method for signature 'RBedMethyl,missing'
beta(a, b)
```

**Arguments**

- a                    An RBedMethyl object.  
b                    Unused, kept for base::beta compatibility.

**Value**

Numeric vector of per-site methylation fractions.

---

filterByCoverage        *Filter by coverage*

---

**Description**

Filter an RBedMethyl object by minimum coverage.

**Usage**

```
filterByCoverage(x, min_cov)
```

**Arguments**

- x                    An RBedMethyl object.  
min\_cov             Minimum coverage threshold.

**Value**

A filtered RBedMethyl object.

**Examples**

```
lines <- c(
  paste("chr1", 0, 1, "m", 0, "+", 0, 1, 0, 10, 0.5, 5, 5, 0, 0, 0, 0, 0, sep = "\t"),
  paste("chr1", 10, 11, "m", 0, "+", 10, 11, 0, 20, 0.25, 5, 15, 0, 0, 0, 0, 0, sep = "\t")
)
tmp <- tempfile(fileext = ".bed")
writeLines(lines, tmp)
bm <- readBedMethyl(tmp, mod = "m", fields = c("coverage", "pct", "mod_reads"))
bm2 <- filterByCoverage(bm, min_cov = 15)
length(RBedMethyl::beta(bm2))
```

---

|                  |                         |
|------------------|-------------------------|
| RBedMethyl-class | <i>RBedMethyl class</i> |
|------------------|-------------------------|

---

### Description

Disk-backed representation of nanoporetech modkit bedMethyl data from ONT sequencing.

### Slots

assays A SimpleList of assay arrays.  
 chrom\_levels Character vector of chromosome names.  
 strand\_levels Character vector of strand levels.  
 chr\_index Matrix of chromosome row ranges (start/end).  
 index Integer vector of active row indices.  
 mod Modification code.

---

|               |  |
|---------------|--|
| readBedMethyl | <i>Read an ONT modkit bedMethyl file</i> |
|---------------|--|

---

### Description

Create an RBedMethyl object backed by HDF5Array from a nanoporetech modkit bedMethyl file (headerless).

### Usage

```
readBedMethyl(
  bedmethyl,
  mod = "m",
  chunk_size = 5e+06,
  h5file = NULL,
  check_sorted = TRUE,
  fields = c("coverage", "mod_reads")
)
```

### Arguments

|              |  |
|--------------|--|
| bedmethyl    | Path to a nanoporetech modkit bedMethyl file (optionally gzipped).   |
| mod          | Modification code to retain ("m" or "h").  |
| chunk_size   | Reserved for future use.   |
| h5file       | Path to the HDF5 file to create. Defaults to a deterministic path in tempdir() derived from the input bedmethyl filename, so subsequent calls reuse the same file. |
| check_sorted | Logical, check that records are sorted by chrom and chromStart.  |
| fields       | Character vector of numeric fields to load. Defaults to c("coverage", "mod_reads").  |

**Value**

An RBedMethyl object.

**Examples**

```
lines <- c(
  paste("chr1", 0, 1, "m", 0, "+", 0, 1, 0, 10, 0.5, 5, 5, 0, 0, 0, 0, 0, sep = "\t"),
  paste("chr1", 10, 11, "m", 0, "+", 10, 11, 0, 20, 0.25, 5, 15, 0, 0, 0, 0, 0, sep = "\t")
)
tmp <- tempfile(fileext = ".bed")
writeLines(lines, tmp)
bm <- readBedMethyl(tmp, mod = "m", fields = c("coverage", "pct", "mod_reads"))
bm
```

---

subsetBy

*Subset by assay predicate*


---

**Description**

Subset an RBedMethyl object using a predicate over an assay.

**Usage**

```
subsetBy(x, column, FUN)
```

**Arguments**

|        |  |
|--------|--|
| x      | An RBedMethyl object.                          |
| column | Assay name to filter on (must be loaded).      |
| FUN    | Predicate function returning a logical vector. |

**Value**

A filtered RBedMethyl object.

**Examples**

```
lines <- c(
  paste("chr1", 0, 1, "m", 0, "+", 0, 1, 0, 10, 0.5, 5, 5, 0, 0, 0, 0, 0, sep = "\t"),
  paste("chr1", 10, 11, "m", 0, "+", 10, 11, 0, 20, 0.25, 5, 15, 0, 0, 0, 0, 0, sep = "\t")
)
tmp <- tempfile(fileext = ".bed")
writeLines(lines, tmp)
bm <- readBedMethyl(tmp, mod = "m", fields = c("coverage", "pct", "mod_reads"))
bm2 <- subsetBy(bm, "coverage", function(v) v >= 15)
length(RBedMethyl::beta(bm2))
```

---

subsetByChromosomes     *Subset by chromosomes*

---

### Description

Subset an RBedMethyl object by one or more chromosomes.

### Usage

```
subsetByChromosomes(x, chr)
```

### Arguments

x                    An RBedMethyl object.  
chr                   Character vector of chromosome names.

### Value

A filtered RBedMethyl object.

### Examples

```
lines <- c(
  paste("chr1", 0, 1, "m", 0, "+", 0, 1, 0, 10, 0.5, 5, 5, 0, 0, 0, 0, 0, sep = "\t"),
  paste("chr2", 10, 11, "m", 0, "+", 10, 11, 0, 20, 0.25, 5, 15, 0, 0, 0, 0, 0, sep = "\t")
)
tmp <- tempfile(fileext = ".bed")
writeLines(lines, tmp)
bm <- readBedMethyl(tmp, mod = "m", fields = c("coverage", "pct", "mod_reads"))
bm2 <- subsetByChromosomes(bm, c("chr1"))
length(RBedMethyl::beta(bm2))
```

---

subsetByRegion             *Subset by region*

---

### Description

Subset an RBedMethyl object by genomic interval.

### Usage

```
subsetByRegion(x, chr, start, end)
```

**Arguments**

|       |                                    |
|-------|------------------------------------|
| x     | An RBedMethyl object.              |
| chr   | Chromosome name.                   |
| start | Region start (0-based, half-open). |
| end   | Region end.                        |

**Value**

A filtered RBedMethyl object.

**Examples**

```
lines <- c(
  paste("chr1", 0, 1, "m", 0, "+", 0, 1, 0, 10, 0.5, 5, 5, 0, 0, 0, 0, 0, sep = "\t"),
  paste("chr1", 10, 11, "m", 0, "+", 10, 11, 0, 20, 0.25, 5, 15, 0, 0, 0, 0, 0, sep = "\t")
)
tmp <- tempfile(fileext = ".bed")
writeLines(lines, tmp)
bm <- readBedMethyl(tmp, mod = "m", fields = c("coverage", "pct", "mod_reads"))
bm2 <- subsetByRegion(bm, "chr1", 0, 5)
length(RBedMethyl::beta(bm2))
```

---

subsetByRegion,RBedMethyl,GRanges,missing,missing-method  
*Subset by GRanges*

---

**Description**

Subset an RBedMethyl object by overlaps with a GRanges.

**Usage**

```
## S4 method for signature 'RBedMethyl,GRanges,missing,missing'
subsetByRegion(x, chr, start, end)
```

**Arguments**

|       |                                       |
|-------|---------------------------------------|
| x     | An RBedMethyl object.                 |
| chr   | A GRanges object of regions.          |
| start | Unused (for signature compatibility). |
| end   | Unused (for signature compatibility). |

**Value**

A filtered RBedMethyl object.

---

summarizeByRegion      *Summarize by regions*

---

### Description

Summarize methylation by a set of regions.

### Usage

```
summarizeByRegion(x, regions)
```

### Arguments

x                      An RBedMethyl object.  
regions                A GRanges of regions.

### Value

A DataFrame with coverage, mod\_reads, beta, and n\_sites.

### Examples

```
lines <- c(
  paste("chr1", 0, 1, "m", 0, "+", 0, 1, 0, 10, 0.5, 5, 5, 0, 0, 0, 0, 0, sep = "\t"),
  paste("chr1", 10, 11, "m", 0, "+", 10, 11, 0, 20, 0.25, 5, 15, 0, 0, 0, 0, 0, sep = "\t")
)
tmp <- tempfile(fileext = ".bed")
writeLines(lines, tmp)
bm <- readBedMethyl(tmp, mod = "m", fields = c("coverage", "pct", "mod_reads"))
regions <- GenomicRanges::GRanges(
  seqnames = "chr1",
  ranges = IRanges::IRanges(start = 1, end = 12)
)
summarizeByRegion(bm, regions)
```

---

[,RBedMethyl,missing,missing,missing-method  
*Subset rows*

---

### Description

Subset an RBedMethyl object by integer, logical, or GRanges index.

### Usage

```
## S4 method for signature 'RBedMethyl,missing,missing,missing'
x[i, j, ..., drop = TRUE]
```

**Arguments**

|      |                                     |
|------|-------------------------------------|
| x    | An RBedMethyl object.               |
| i    | Integer, logical, or GRanges index. |
| j    | Unused.                             |
| ...  | Unused.                             |
| drop | Unused.                             |

**Value**

A filtered RBedMethyl object.

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