

miRBaseVersions.db-vignette

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The [miRBase](#) database (Griffiths-Jones, 2004; Griffiths-Jones, Grocock, Dongen, Bateman, & Enright, 2006; Griffiths-Jones, Saini, Dongen, & Enright, 2008; Kozomara & Griffiths-Jones, 2011, 2014) is the official repository for miRNAs and includes a miRNA naming convention (AMBROS et al., 2003; Meyers et al., 2008). Over the years of development miRNAs have been added to, or deleted from the database, while some miRNA names have been changed. As a result, each version of the miRBase database can differ substantially from previous versions.

The *miRBaseVersions.db* R package has been developed to provide an easy accessible repository for several different miRBase release versions.

1. Introduction

The *miRBaseVersions.db* package is an annotation package which includes mature miRNA names from 21 miRBase release versions. Due to ongoing growth and changes with each release miRNA names can have different names in different versions or even are not listed as valid miRNAs anymore. This annotation package serves as a repository and can be used for quick lookup for mature miRNA names. The *miRBaseVersions.db* package has implemented the AnnotationDbi-select interface. By implementing this `select` interface the user is able to use the same methods as for any other annotation package.

The main four implemented methods are

- `columns`, presents the values one can retrieve in the final result,
- `keytypes`, which presents the tables that can be used in this package,
- `keys`, is used to get viable keys of a particular `keytype` and
- `select`, which is used to extract data from the annotation package by using values provided by the other three methods.

To load the package and gain access to the functions just run the following command:

```
library(miRBaseVersions.db)
```

```
## Loading required package: DBI
```

Vignette Info

This vignette has been generated using an R Markdown file with `knitr:rmarkdown` as vignette engine (Boettiger, 2015; Francois, 2014; Xie, 2014, 2015b, 2015a).

Database information

The data is the *miRNANameConverter* package is stored in an SQLite database. All entries contained in the database were downloaded from the [miRBase ftp-site](#). The following versions are available:

miRBase Version	# Mature Entries	Release Date
6.0	1591	04/05
7.1	3101	10/05
8.0	3228	02/06
8.1	3684	05/06
8.2	3834	07/06
9.0	4167	10/06
9.1	4274	02/07
9.2	4430	05/07
10.0	5395	08/07
10.1	5718	12/07
11.0	6703	04/08
12.0	9110	09/08
13.0	10097	03/09
14.0	11663	09/09
15.0	15632	04/10
16.0	17341	08/10
17.0	19724	04/11
18.0	21643	11/11
19.0	25141	08/12
20.0	30424	06/13
21.0	35828	06/14

from 228 organisms.

2. Use Cases

2.1 Function keytypes

Use this function to receive table names from where data can be retrieved:

```
keytypes(miRBaseVersions.db);
```

```
## [1] "MIMAT"          "VW-MIMAT-10.0" "VW-MIMAT-10.1" "VW-MIMAT-11.0"
## [5] "VW-MIMAT-12.0" "VW-MIMAT-13.0" "VW-MIMAT-14.0" "VW-MIMAT-15.0"
## [9] "VW-MIMAT-16.0" "VW-MIMAT-17.0" "VW-MIMAT-18.0" "VW-MIMAT-19.0"
## [13] "VW-MIMAT-20.0" "VW-MIMAT-21.0" "VW-MIMAT-6.0"  "VW-MIMAT-7.1"
## [17] "VW-MIMAT-8.0"  "VW-MIMAT-8.1"  "VW-MIMAT-8.2"  "VW-MIMAT-9.0"
## [21] "VW-MIMAT-9.1"  "VW-MIMAT-9.2"
```

The output lists 22 tables where each one of them can be queried. The keytype “MIMAT” is the main table containing all records from all supported miRBase release versions. Keytypes starting with the prefix “VW-MIMAT” are so called SQL views. For example the keytype “VW-MIMAT-21.0” is an SQL view from the “MIMAT” table which only holds records from miRBase version 21.0.

2.2 Function columns

Use the `columns` function to retrieve information about the kind of variables you can retrieve in the final output:

```
columns(miRBaseVersions.db);
```

```
## [1] "ACCESSION" "NAME" "ORGANISM" "SEQUENCE" "VERSION"
```

All 5 columns are available for all 22 keytypes.

2.3 Function keys

The `keys` function returns all viable keys of a particular keytype. The following example retrieves all possible keys for miRBase release version 6.0.

```
k = head(keys(miRBaseVersions.db, keytype = "VW-MIMAT-6.0"));
k;
```

```
## [1] "MIMAT0000001" "MIMAT0000002" "MIMAT0000003" "MIMAT0000004"
## [5] "MIMAT0000005" "MIMAT0000006"
```

2.4 Function select

The `select` function is used to extract data. As input values the function takes outputs received from the other three functions `keys`, `columns` and `keytypes`.

For example to extract all information about the mature accession 'MIMAT0000092' we can run the following command:

```
result = select(miRBaseVersions.db,
               keys = "MIMAT0000092",
               keytype = "MIMAT",
               columns = "*")
result;
```

##	ACCESSION	NAME	SEQUENCE	VERSION	ORGANISM
## 1	MIMAT0000092	hsa-miR-92a-3p	UAUUGCACUUGUCCCGGCCUGU	21.0	hsa
## 2	MIMAT0000092	hsa-miR-92a-3p	UAUUGCACUUGUCCCGGCCUGU	20.0	hsa
## 3	MIMAT0000092	hsa-miR-92a-3p	UAUUGCACUUGUCCCGGCCUGU	19.0	hsa
## 4	MIMAT0000092	hsa-miR-92a-3p	UAUUGCACUUGUCCCGGCCUGU	18.0	hsa
## 5	MIMAT0000092	hsa-miR-92a	UAUUGCACUUGUCCCGGCCUGU	17.0	hsa
## 6	MIMAT0000092	hsa-miR-92a	UAUUGCACUUGUCCCGGCCUGU	16.0	hsa
## 7	MIMAT0000092	hsa-miR-92a	UAUUGCACUUGUCCCGGCCUGU	15.0	hsa
## 8	MIMAT0000092	hsa-miR-92a	UAUUGCACUUGUCCCGGCCUGU	14.0	hsa
## 9	MIMAT0000092	hsa-miR-92a	UAUUGCACUUGUCCCGGCCUGU	13.0	hsa
## 10	MIMAT0000092	hsa-miR-92a	UAUUGCACUUGUCCCGGCCUGU	12.0	hsa
## 11	MIMAT0000092	hsa-miR-92a	UAUUGCACUUGUCCCGGCCUGU	11.0	hsa
## 12	MIMAT0000092	hsa-miR-92a	UAUUGCACUUGUCCCGGCCUGU	10.1	hsa
## 13	MIMAT0000092	hsa-miR-92a	UAUUGCACUUGUCCCGGCCUGU	10.0	hsa
## 14	MIMAT0000092	hsa-miR-92	UAUUGCACUUGUCCCGGCCUG	9.2	hsa
## 15	MIMAT0000092	hsa-miR-92	UAUUGCACUUGUCCCGGCCUG	9.1	hsa

```
## 16 MIMAT0000092 hsa-miR-92 UAUUGCACUUGUCCCGGCCUG 9.0 hsa
## 17 MIMAT0000092 hsa-miR-92 UAUUGCACUUGUCCCGGCCUG 8.2 hsa
## 18 MIMAT0000092 hsa-miR-92 UAUUGCACUUGUCCCGGCCUG 8.1 hsa
## 19 MIMAT0000092 hsa-miR-92 UAUUGCACUUGUCCCGGCCUG 8.0 hsa
## 20 MIMAT0000092 hsa-miR-92 UAUUGCACUUGUCCCGGCCUG 7.1 hsa
## 21 MIMAT0000092 hsa-miR-92 UAUUGCACUUGUCCCGGCCUG 6.0 hsa
```

As we can see the result returns all miRNA names the accession had among the different miRBase releases. If we for example only want to extract the fields for 'accession', 'name' and 'version' we simply run the following command:

```
result = select(miRBaseVersions.db,
               keys = "MIMAT0000092",
               keytype = "MIMAT",
               columns = c("ACCESSION", "NAME", "VERSION"))
```

```
## Warning in if (columns != "*") {: the condition has length > 1 and only the
## first element will be used
```

```
result;
```

```
##      ACCESSION      NAME VERSION
## 1 MIMAT0000092 hsa-miR-92a-3p 21.0
## 2 MIMAT0000092 hsa-miR-92a-3p 20.0
## 3 MIMAT0000092 hsa-miR-92a-3p 19.0
## 4 MIMAT0000092 hsa-miR-92a-3p 18.0
## 5 MIMAT0000092 hsa-miR-92a    17.0
## 6 MIMAT0000092 hsa-miR-92a    16.0
## 7 MIMAT0000092 hsa-miR-92a    15.0
## 8 MIMAT0000092 hsa-miR-92a    14.0
## 9 MIMAT0000092 hsa-miR-92a    13.0
## 10 MIMAT0000092 hsa-miR-92a    12.0
## 11 MIMAT0000092 hsa-miR-92a    11.0
## 12 MIMAT0000092 hsa-miR-92a    10.1
## 13 MIMAT0000092 hsa-miR-92a    10.0
## 14 MIMAT0000092 hsa-miR-92     9.2
## 15 MIMAT0000092 hsa-miR-92     9.1
## 16 MIMAT0000092 hsa-miR-92     9.0
## 17 MIMAT0000092 hsa-miR-92     8.2
## 18 MIMAT0000092 hsa-miR-92     8.1
## 19 MIMAT0000092 hsa-miR-92     8.0
## 20 MIMAT0000092 hsa-miR-92     7.1
## 21 MIMAT0000092 hsa-miR-92     6.0
```

In comparison to the previous output with parameter `columns = "*"` this time only the selected columns were returned.

Additional information

Packages loaded via namespace

The following packages are used in the `miRBaseVersions.db` package:

- AnnotationDbi_1.32.3 (Pages, Carlson, Falcon, & Li, n.d.)
- DBI_0.3.1 (Databases, 2014)
- RSQLite_1.0.0 (Wickham, James, & Falcon, 2014)
- gtools_3.5.0 (Warnes, Bolker, & Lumley, 2015)

Future Aspects

This database can only be of good use if it will be kept up to date. Therefore we plan to include new miRBase releases as soon as possible.

References

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