Dessication Evolution

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2025-06-12

```
library(tidyr)
```

```
## Warning: package 'tidyr' was built under R version 4.4.3
```

```
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 4.4.3
```

```
library(stringr)
```

```
## Warning: package 'stringr' was built under R version 4.4.3
```

```
library(dplyr)
```

```
## Warning: package 'dplyr' was built under R version 4.4.3
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(tidyverse)
```

```
## Warning: package 'tidyverse' was built under R version 4.4.3
```

```
## Warning: package 'tibble' was built under R version 4.4.3
```

```
## Warning: package 'readr' was built under R version 4.4.3
```

```
## Warning: package 'purrr' was built under R version 4.4.3
```

```
## Warning: package 'forcats' was built under R version 4.4.3
```

```
## Warning: package 'lubridate' was built under R version 4.4.3
```

```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v forcats   1.0.0     v readr     2.1.5
## v lubridate 1.9.4     v tibble    3.2.1
## v purrr     1.0.4
```

```
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
require(survival)
```

```
## Loading required package: survival
```

```
require(extrafont)
```

```
## Loading required package: extrafont
## Registering fonts with R
```

```
theme_set(theme_classic() +
  theme(axis.title = element_text(size = 16),
        axis.title.x = element_text(margin = margin(t = 15, b = 15)),
        axis.title.y = element_text(margin = margin(l = 15, r = 15)),
        axis.text = element_text(size = 13),
        axis.text.x = element_text(margin = margin(t = 5)),
        axis.text.y = element_text(margin = margin(r = 5)),
        #axis.line.x = element_line(linewidth = 1),
        #axis.line.y = element_line(linewidth = 1),
        axis.line.x = element_blank(),
        axis.line.y = element_blank(),
        axis.ticks.x = element_line(linewidth = 1),
        axis.ticks.y = element_line(linewidth = 1),
        axis.ticks.length = unit(.1, "in"),
        panel.border = element_rect(color = "grey20", fill = NA, linewidth = 1.5),
        legend.text = element_text(size = 14),
        strip.text = element_text(size = 14),
        strip.background = element_blank()
        ))
```

```
setwd("C:/Users/ajl21/github/division.labor/Survivorship.desiccation/Data_D6/")
#data: Turbidity 0 alive 1 death; Strain 1 Delta 6 0 SPOIIE;
#Experiment 5- desiccation 24 hr; Experiment 6 - desiccation 48 hr; desiccation 7 - 4 hours
data <- read.csv("20250624_1206_Surv_master.csv")# 1 is D6 and 2 is SPO; Event - 0 if lived 1 if died
data
```

```
##     Well Event Strain Hour Experiment
## 1     A1     0      1    5          3
```

```
## 2     A2     0      1    5          3
## 3     A3     0      1    5          3
## 4     A4     0      1    5          3
## 5     A5     0      1    5          3
## 6     A6     0      1    5          3
## 7     A7     0      1    5          3
## 8     A8     0      1    5          3
## 9     A9     0      1    5          3
## 10   A10     0      1    5          3
## 11   A11     0      1    5          3
## 12   A12     0      1    5          3
## 13    B1     0      1    7          3
## 14    B2     0      1    7          3
## 15    B3     0      1    7          3
## 16    B4     0      1    7          3
## 17    B5     0      1    7          3
## 18    B6     0      1    7          3
## 19    B7     0      1    7          3
## 20    B8     0      1    7          3
## 21    B9     0      1    7          3
## 22   B10     0      1    7          3
## 23   B11     0      1    7          3
## 24   B12     0      1    7          3
## 25    C1     0      1   24          3
## 26    C2     0      1   24          3
## 27    C3     0      1   24          3
## 28    C4     0      1   24          3
## 29    C5     0      1   24          3
## 30    C6     0      1   24          3
## 31    C7     0      1   24          3
## 32    C8     0      1   24          3
## 33    C9     0      1   24          3
## 34   C10     0      1   24          3
## 35   C11     0      1   24          3
## 36   C12     0      1   24          3
## 37    D1     1      1   27          3
## 38    D2     0      1   27          3
## 39    D3     0      1   27          3
## 40    D4     0      1   27          3
## 41    D5     0      1   27          3
## 42    D6     0      1   27          3
## 43    D7     0      1   27          3
## 44    D8     0      1   27          3
## 45    D9     0      1   27          3
## 46   D10     0      1   27          3
## 47   D11     1      1   27          3
## 48   D12     0      1   27          3
## 49    E1     1      2    5          3
## 50    E2     1      2    5          3
## 51    E3     1      2    5          3
## 52    E4     1      2    5          3
## 53    E5     0      2    5          3
## 54    E6     1      2    5          3
## 55    E7     1      2    5          3
```

```
## 56    E8     1      2    5          3
## 57    E9     1      2    5          3
## 58   E10     0      2    5          3
## 59   E11     1      2    5          3
## 60   E12     1      2    5          3
## 61    F1     0      2    7          3
## 62    F2     0      2    7          3
## 63    F3     0      2    7          3
## 64    F4     0      2    7          3
## 65    F5     0      2    7          3
## 66    F6     0      2    7          3
## 67    F7     0      2    7          3
## 68    F8     0      2    7          3
## 69    F9     0      2    7          3
## 70   F10     0      2    7          3
## 71   F11     0      2    7          3
## 72   F12     0      2    7          3
## 73    G1     0      2   24          3
## 74    G2     0      2   24          3
## 75    G3     0      2   24          3
## 76    G4     0      2   24          3
## 77    G5     0      2   24          3
## 78    G6     0      2   24          3
## 79    G7     0      2   24          3
## 80    G8     0      2   24          3
## 81    G9     0      2   24          3
## 82   G10     0      2   24          3
## 83   G11     0      2   24          3
## 84   G12     0      2   24          3
## 85    H1     1      2   27          3
## 86    H2     1      2   27          3
## 87    H3     1      2   27          3
## 88    H4     1      2   27          3
## 89    H5     1      2   27          3
## 90    H6     1      2   27          3
## 91    H7     1      2   27          3
## 92    H8     1      2   27          3
## 93    H9     1      2   27          3
## 94   H10     1      2   27          3
## 95   H11     1      2   27          3
## 96   H12     1      2   27          3
## 97    A1     0      1    5          2
## 98    A2     0      1    5          2
## 99    A3     0      1    5          2
## 100   A4     0      1    5          2
## 101   A5     0      1    5          2
## 102   A6     0      1    5          2
## 103   A7     0      1    5          2
## 104   A8     0      1    5          2
## 105   A9     0      1    5          2
## 106  A10     0      1    5          2
## 107  A11     0      1    5          2
## 108  A12     0      1    5          2
## 109   B1     0      1    5          2
```

```
## 110   B2     0      1    5          2
## 111   B3     0      1    5          2
## 112   B4     0      1    5          2
## 113   B5     0      1    5          2
## 114   B6     0      1    5          2
## 115   B7     0      1    5          2
## 116   B8     0      1    5          2
## 117   B9     0      1    5          2
## 118  B10     0      1    5          2
## 119  B11     0      1    5          2
## 120  B12     0      1    5          2
## 121   C1     0      1   24          2
## 122   C2     0      1   24          2
## 123   C3     0      1   24          2
## 124   C4     0      1   24          2
## 125   C5     0      1   24          2
## 126   C6     0      1   24          2
## 127   C7     0      1   24          2
## 128   C8     0      1   24          2
## 129   C9     0      1   24          2
## 130  C10     0      1   24          2
## 131  C11     0      1   24          2
## 132  C12     0      1   24          2
## 133   D1     0      1   31          2
## 134   D2     0      1   31          2
## 135   D3     0      1   31          2
## 136   D4     0      1   31          2
## 137   D5     0      1   31          2
## 138   D6     0      1   31          2
## 139   D7     0      1   31          2
## 140   D8     0      1   31          2
## 141   D9     0      1   31          2
## 142  D10     0      1   31          2
## 143  D11     0      1   31          2
## 144  D12     0      1   31          2
## 145   E1     1      2    5          2
## 146   E2     0      2    5          2
## 147   E3     0      2    5          2
## 148   E4     0      2    5          2
## 149   E5     0      2    5          2
## 150   E6     0      2    5          2
## 151   E7     0      2    5          2
## 152   E8     0      2    5          2
## 153   E9     0      2    5          2
## 154  E10     0      2    5          2
## 155  E11     1      2    5          2
## 156  E12     0      2    5          2
## 157   F1     0      2    5          2
## 158   F2     0      2    5          2
## 159   F3     0      2    5          2
## 160   F4     0      2    5          2
## 161   F5     0      2    5          2
## 162   F6     0      2    5          2
## 163   F7     0      2    5          2
```

```
## 164   F8     0      2    5          2
## 165   F9     0      2    5          2
## 166  F10     0      2    5          2
## 167  F11     0      2    5          2
## 168  F12     0      2    5          2
## 169   G1     1      2   31          2
## 170   G2     0      2   31          2
## 171   G3     0      2   31          2
## 172   G4     0      2   31          2
## 173   G5     0      2   31          2
## 174   G6     0      2   31          2
## 175   G7     0      2   31          2
## 176   G8     0      2   31          2
## 177   G9     0      2   31          2
## 178  G10     0      2   31          2
## 179  G11     0      2   31          2
## 180  G12     0      2   31          2
## 181   H1     1      2   24          2
## 182   H2     0      2   24          2
## 183   H3     0      2   24          2
## 184   H4     0      2   24          2
## 185   H5     0      2   24          2
## 186   H6     0      2   24          2
## 187   H7     0      2   24          2
## 188   H8     0      2   24          2
## 189   H9     0      2   24          2
## 190  H10     0      2   24          2
## 191  H11     0      2   24          2
## 192  H12     1      2   24          2
## 193   A1     0      1   24         P1
## 194   A2     0      1   24         P1
## 195   A3     0      1   24         P1
## 196   A4     0      1   24         P1
## 197   A5     0      1   24         P1
## 198   A6     0      1   24         P1
## 199   A7     0      1   24         P1
## 200   A8     0      1   24         P1
## 201   A9     0      1   24         P1
## 202  A10     0      1   24         P1
## 203  A11     0      1   24         P1
## 204  A12     0      1   24         P1
## 205   B1     0      1   24         P1
## 206   B2     0      1   24         P1
## 207   B3     0      1   24         P1
## 208   B4     0      1   24         P1
## 209   B5     0      1   24         P1
## 210   B6     0      1   24         P1
## 211   B7     0      1   24         P1
## 212   B8     0      1   24         P1
## 213   B9     0      1   24         P1
## 214  B10     0      1   24         P1
## 215  B11     0      1   24         P1
## 216  B12     0      1   24         P1
## 217   C1     0      1   24         P1
```

```
## 218   C2     0      1   24         P1
## 219   C3     0      1   24         P1
## 220   C4     0      1   24         P1
## 221   C5     0      1   24         P1
## 222   C6     0      1   24         P1
## 223   C7     0      1   24         P1
## 224   C8     0      1   24         P1
## 225   C9     0      1   24         P1
## 226  C10     0      1   24         P1
## 227  C11     0      1   24         P1
## 228  C12     0      1   24         P1
## 229   D1     0      1   24         P1
## 230   D2     0      1   24         P1
## 231   D3     0      1   24         P1
## 232   D4     0      1   24         P1
## 233   D5     0      1   24         P1
## 234   D6     0      1   24         P1
## 235   D7     0      1   24         P1
## 236   D8     0      1   24         P1
## 237   D9     0      1   24         P1
## 238  D10     0      1   24         P1
## 239  D11     0      1   24         P1
## 240  D12     0      1   24         P1
## 241   E1     1      2   24         P1
## 242   E2     1      2   24         P1
## 243   E3     1      2   24         P1
## 244   E4     1      2   24         P1
## 245   E5     1      2   24         P1
## 246   E6     1      2   24         P1
## 247   E7     1      2   24         P1
## 248   E8     1      2   24         P1
## 249   E9     1      2   24         P1
## 250  E10     1      2   24         P1
## 251  E11     1      2   24         P1
## 252  E12     0      2   24         P1
## 253   F1     1      2   24         P1
## 254   F2     1      2   24         P1
## 255   F3     1      2   24         P1
## 256   F4     1      2   24         P1
## 257   F5     1      2   24         P1
## 258   F6     1      2   24         P1
## 259   F7     1      2   24         P1
## 260   F8     0      2   24         P1
## 261   F9     1      2   24         P1
## 262  F10     1      2   24         P1
## 263  F11     1      2   24         P1
## 264  F12     0      2   24         P1
## 265   G1     1      2   24         P1
## 266   G2     1      2   24         P1
## 267   G3     1      2   24         P1
## 268   G4     1      2   24         P1
## 269   G5     0      2   24         P1
## 270   G6     1      2   24         P1
## 271   G7     1      2   24         P1
```

```
## 272   G8     1      2   24         P1
## 273   G9     1      2   24         P1
## 274  G10     1      2   24         P1
## 275  G11     1      2   24         P1
## 276  G12     1      2   24         P1
## 277   H1     1      2   24         P1
## 278   H2     1      2   24         P1
## 279   H3     1      2   24         P1
## 280   H4     1      2   24         P1
## 281   H5     1      2   24         P1
## 282   H6     1      2   24         P1
## 283   H7     1      2   24         P1
## 284   H8     1      2   24         P1
## 285   H9     1      2   24         P1
## 286  H10     1      2   24         P1
## 287  H11     1      2   24         P1
## 288  H12     1      2   24         P1
## 289   A1     0      1   24         P2
## 290   A2     0      1   24         P2
## 291   A3     0      1   24         P2
## 292   A4     0      1   24         P2
## 293   A5     0      1   24         P2
## 294   A6     0      1   24         P2
## 295   A7     0      1   24         P2
## 296   A8     0      1   24         P2
## 297   A9     0      1   24         P2
## 298  A10     0      1   24         P2
## 299  A11     0      1   24         P2
## 300  A12     0      1   24         P2
## 301   B1     0      1   24         P2
## 302   B2     0      1   24         P2
## 303   B3     0      1   24         P2
## 304   B4     0      1   24         P2
## 305   B5     0      1   24         P2
## 306   B6     0      1   24         P2
## 307   B7     0      1   24         P2
## 308   B8     0      1   24         P2
## 309   B9     0      1   24         P2
## 310  B10     0      1   24         P2
## 311  B11     0      1   24         P2
## 312  B12     0      1   24         P2
## 313   C1     0      1   24         P2
## 314   C2     0      1   24         P2
## 315   C3     0      1   24         P2
## 316   C4     0      1   24         P2
## 317   C5     0      1   24         P2
## 318   C6     0      1   24         P2
## 319   C7     0      1   24         P2
## 320   C8     0      1   24         P2
## 321   C9     0      1   24         P2
## 322  C10     0      1   24         P2
## 323  C11     0      1   24         P2
## 324  C12     0      1   24         P2
## 325   D1     0      1   24         P2
```

```
## 326   D2     0      1   24         P2
## 327   D3     0      1   24         P2
## 328   D4     0      1   24         P2
## 329   D5     0      1   24         P2
## 330   D6     0      1   24         P2
## 331   D7     0      1   24         P2
## 332   D8     0      1   24         P2
## 333   D9     0      1   24         P2
## 334  D10     0      1   24         P2
## 335  D11     0      1   24         P2
## 336  D12     0      1   24         P2
## 337   E1     1      2   24         P2
## 338   E2     1      2   24         P2
## 339   E3     1      2   24         P2
## 340   E4     1      2   24         P2
## 341   E5     1      2   24         P2
## 342   E6     1      2   24         P2
## 343   E7     1      2   24         P2
## 344   E8     1      2   24         P2
## 345   E9     1      2   24         P2
## 346  E10     1      2   24         P2
## 347  E11     1      2   24         P2
## 348  E12     1      2   24         P2
## 349   F1     1      2   24         P2
## 350   F2     1      2   24         P2
## 351   F3     1      2   24         P2
## 352   F4     1      2   24         P2
## 353   F5     1      2   24         P2
## 354   F6     1      2   24         P2
## 355   F7     1      2   24         P2
## 356   F8     1      2   24         P2
## 357   F9     1      2   24         P2
## 358  F10     1      2   24         P2
## 359  F11     1      2   24         P2
## 360  F12     1      2   24         P2
## 361   G1     1      2   24         P2
## 362   G2     1      2   24         P2
## 363   G3     1      2   24         P2
## 364   G4     1      2   24         P2
## 365   G5     1      2   24         P2
## 366   G6     1      2   24         P2
## 367   G7     1      2   24         P2
## 368   G8     1      2   24         P2
## 369   G9     1      2   24         P2
## 370  G10     1      2   24         P2
## 371  G11     1      2   24         P2
## 372  G12     1      2   24         P2
## 373   H1     1      2   24         P2
## 374   H2     1      2   24         P2
## 375   H3     1      2   24         P2
## 376   H4     1      2   24         P2
## 377   H5     1      2   24         P2
## 378   H6     1      2   24         P2
## 379   H7     1      2   24         P2
```

```
## 380   H8     1      2   24         P2
## 381   H9     1      2   24         P2
## 382  H10     1      2   24         P2
## 383  H11     1      2   24         P2
## 384  H12     1      2   24         P2
## 385   A1     0      1   24         P3
## 386   A2     0      1   24         P3
## 387   A3     0      1   24         P3
## 388   A4     0      1   24         P3
## 389   A5     0      1   24         P3
## 390   A6     0      1   24         P3
## 391   A7     0      1   24         P3
## 392   A8     0      1   24         P3
## 393   A9     0      1   24         P3
## 394  A10     0      1   24         P3
## 395  A11     0      1   24         P3
## 396  A12     0      1   24         P3
## 397   B1     0      1   24         P3
## 398   B2     0      1   24         P3
## 399   B3     0      1   24         P3
## 400   B4     0      1   24         P3
## 401   B5     0      1   24         P3
## 402   B6     0      1   24         P3
## 403   B7     0      1   24         P3
## 404   B8     0      1   24         P3
## 405   B9     0      1   24         P3
## 406  B10     0      1   24         P3
## 407  B11     0      1   24         P3
## 408  B12     0      1   24         P3
## 409   C1     0      1   24         P3
## 410   C2     0      1   24         P3
## 411   C3     0      1   24         P3
## 412   C4     0      1   24         P3
## 413   C5     0      1   24         P3
## 414   C6     0      1   24         P3
## 415   C7     0      1   24         P3
## 416   C8     0      1   24         P3
## 417   C9     0      1   24         P3
## 418  C10     0      1   24         P3
## 419  C11     0      1   24         P3
## 420  C12     0      1   24         P3
## 421   D1     0      1   24         P3
## 422   D2     0      1   24         P3
## 423   D3     0      1   24         P3
## 424   D4     0      1   24         P3
## 425   D5     0      1   24         P3
## 426   D6     0      1   24         P3
## 427   D7     0      1   24         P3
## 428   D8     0      1   24         P3
## 429   D9     0      1   24         P3
## 430  D10     0      1   24         P3
## 431  D11     0      1   24         P3
## 432  D12     0      1   24         P3
## 433   E1     1      2   24         P3
```

```
## 434   E2     1      2   24          P3
## 435   E3     0      2   24          P3
## 436   E4     0      2   24          P3
## 437   E5     0      2   24          P3
## 438   E6     0      2   24          P3
## 439   E7     0      2   24          P3
## 440   E8     0      2   24          P3
## 441   E9     0      2   24          P3
## 442  E10     0      2   24          P3
## 443  E11     0      2   24          P3
## 444  E12     1      2   24          P3
## 445   F1     1      2   24          P3
## 446   F2     1      2   24          P3
## 447   F3     0      2   24          P3
## 448   F4     0      2   24          P3
## 449   F5     0      2   24          P3
## 450   F6     0      2   24          P3
## 451   F7     0      2   24          P3
## 452   F8     0      2   24          P3
## 453   F9     0      2   24          P3
## 454  F10     0      2   24          P3
## 455  F11     1      2   24          P3
## 456  F12     1      2   24          P3
## 457   G1     1      2   24          P3
## 458   G2     1      2   24          P3
## 459   G3     1      2   24          P3
## 460   G4     0      2   24          P3
## 461   G5     0      2   24          P3
## 462   G6     0      2   24          P3
## 463   G7     0      2   24          P3
## 464   G8     0      2   24          P3
## 465   G9     1      2   24          P3
## 466  G10     1      2   24          P3
## 467  G11     1      2   24          P3
## 468  G12     1      2   24          P3
## 469   H1     1      2   24          P3
## 470   H2     1      2   24          P3
## 471   H3     1      2   24          P3
## 472   H4     1      2   24          P3
## 473   H5     1      2   24          P3
## 474   H6     1      2   24          P3
## 475   H7     1      2   24          P3
## 476   H8     1      2   24          P3
## 477   H9     1      2   24          P3
## 478  H10     1      2   24          P3
## 479  H11     1      2   24          P3
## 480  H12     1      2   24          P3
## 481   A1     0      1   24          P4
## 482   A2     0      1   24          P4
## 483   A3     0      1   24          P4
## 484   A4     0      1   24          P4
## 485   A5     0      1   24          P4
## 486   A6     0      1   24          P4
## 487   A7     0      1   24          P4
```

```
## 488   A8     0      1   24         P4
## 489   A9     0      1   24         P4
## 490  A10     0      1   24         P4
## 491  A11     0      1   24         P4
## 492  A12     0      1   24         P4
## 493   B1     0      1   24         P4
## 494   B2     0      1   24         P4
## 495   B3     0      1   24         P4
## 496   B4     0      1   24         P4
## 497   B5     0      1   24         P4
## 498   B6     0      1   24         P4
## 499   B7     0      1   24         P4
## 500   B8     0      1   24         P4
## 501   B9     0      1   24         P4
## 502  B10     0      1   24         P4
## 503  B11     0      1   24         P4
## 504  B12     0      1   24         P4
## 505   C1     0      1   24         P4
## 506   C2     0      1   24         P4
## 507   C3     0      1   24         P4
## 508   C4     0      1   24         P4
## 509   C5     0      1   24         P4
## 510   C6     0      1   24         P4
## 511   C7     0      1   24         P4
## 512   C8     0      1   24         P4
## 513   C9     0      1   24         P4
## 514  C10     0      1   24         P4
## 515  C11     0      1   24         P4
## 516  C12     0      1   24         P4
## 517   D1     0      1   24         P4
## 518   D2     0      1   24         P4
## 519   D3     0      1   24         P4
## 520   D4     0      1   24         P4
## 521   D5     0      1   24         P4
## 522   D6     0      1   24         P4
## 523   D7     0      1   24         P4
## 524   D8     0      1   24         P4
## 525   D9     0      1   24         P4
## 526  D10     0      1   24         P4
## 527  D11     0      1   24         P4
## 528  D12     0      1   24         P4
## 529   E1     1      2   24         P4
## 530   E2     1      2   24         P4
## 531   E3     1      2   24         P4
## 532   E4     1      2   24         P4
## 533   E5     1      2   24         P4
## 534   E6     1      2   24         P4
## 535   E7     1      2   24         P4
## 536   E8     1      2   24         P4
## 537   E9     1      2   24         P4
## 538  E10     1      2   24         P4
## 539  E11     1      2   24         P4
## 540  E12     1      2   24         P4
## 541   F1     1      2   24         P4
```

```
## 542   F2     1      2   24         P4
## 543   F3     1      2   24         P4
## 544   F4     1      2   24         P4
## 545   F5     1      2   24         P4
## 546   F6     1      2   24         P4
## 547   F7     1      2   24         P4
## 548   F8     1      2   24         P4
## 549   F9     1      2   24         P4
## 550  F10     1      2   24         P4
## 551  F11     1      2   24         P4
## 552  F12     1      2   24         P4
## 553   G1     1      2   24         P4
## 554   G2     1      2   24         P4
## 555   G3     1      2   24         P4
## 556   G4     1      2   24         P4
## 557   G5     1      2   24         P4
## 558   G6     1      2   24         P4
## 559   G7     1      2   24         P4
## 560   G8     1      2   24         P4
## 561   G9     1      2   24         P4
## 562  G10     1      2   24         P4
## 563  G11     1      2   24         P4
## 564  G12     1      2   24         P4
## 565   H1     1      2   24         P4
## 566   H2     1      2   24         P4
## 567   H3     1      2   24         P4
## 568   H4     1      2   24         P4
## 569   H5     1      2   24         P4
## 570   H6     1      2   24         P4
## 571   H7     1      2   24         P4
## 572   H8     1      2   24         P4
## 573   H9     1      2   24         P4
## 574  H10     1      2   24         P4
## 575  H11     1      2   24         P4
## 576  H12     1      2   24         P4
```

```
data$Strain <- factor(data$Strain)
surv <-data
```

```
biofsurv <- Surv(surv$Hour,surv$Event)
print(biofsurv)
```

```
##   [1]  5+  5+  5+  5+  5+  5+  5+  5+  5+  5+  5+  5+  7+  7+  7+  7+  7+  7+
##  [19]  7+  7+  7+  7+  7+  7+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
##  [37] 27  27+ 27+ 27+ 27+ 27+ 27+ 27+ 27+ 27+ 27  27+  5   5   5   5   5+  5
##  [55]  5   5   5   5+  5   5   7+  7+  7+  7+  7+  7+  7+  7+  7+  7+  7+  7+
##  [73] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 27  27  27  27  27  27
##  [91] 27  27  27  27  27  27   5+  5+  5+  5+  5+  5+  5+  5+  5+  5+  5+  5+
## [109]  5+  5+  5+  5+  5+  5+  5+  5+  5+  5+  5+  5+  5+ 24+ 24+ 24+ 24+ 24+ 24+
## [127] 24+ 24+ 24+ 24+ 24+ 24+ 31+ 31+ 31+ 31+ 31+ 31+ 31+ 31+ 31+ 31+ 31+ 31+
## [145]  5   5+  5+  5+  5+  5+  5+  5+  5+  5+  5   5+  5+  5+  5+  5+  5+  5+
## [163]  5+  5+  5+  5+  5+  5+ 31  31+ 31+ 31+ 31+ 31+ 31+ 31+ 31+ 31+ 31+ 31+
## [181] 24  24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24  24+ 24+ 24+ 24+ 24+ 24+
```

```
## [199] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
## [217] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
## [235] 24+ 24+ 24+ 24+ 24+ 24+ 24  24  24  24  24  24  24  24  24  24  24  24+
## [253] 24  24  24  24  24  24  24  24+ 24  24  24  24+ 24  24  24  24  24+ 24
## [271] 24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24
## [289] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
## [307] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
## [325] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24  24  24  24  24  24
## [343] 24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24
## [361] 24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24
## [379] 24  24  24  24  24  24  24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
## [397] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
## [415] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
## [433] 24  24  24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24  24  24  24+ 24+ 24+ 24+
## [451] 24+ 24+ 24+ 24+ 24  24  24  24  24  24+ 24+ 24+ 24+ 24+ 24  24  24  24
## [469] 24  24  24  24  24  24  24  24  24  24  24  24  24+ 24+ 24+ 24+ 24+ 24+
## [487] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
## [505] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
## [523] 24+ 24+ 24+ 24+ 24+ 24+ 24  24  24  24  24  24  24  24  24  24  24  24
## [541] 24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24
## [559] 24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24
```

```
biofsurv.fit <- survfit(biofsurv ~ surv$Strain, conf.int = TRUE,
                type = "kaplan-meier")
biofsurv.diff <- survdiff(Surv(surv$Hour,surv$Event) ~ surv$Strain, data = surv)

print(biofsurv)
```

```
##   [1]  5+  5+  5+  5+  5+  5+  5+  5+  5+  5+  5+  5+  7+  7+  7+  7+  7+  7+
##  [19]  7+  7+  7+  7+  7+  7+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
##  [37] 27  27+ 27+ 27+ 27+ 27+ 27+ 27+ 27+ 27+ 27  27+  5   5   5   5   5+  5
##  [55]  5   5   5   5+  5   5   7+  7+  7+  7+  7+  7+  7+  7+  7+  7+  7+  7+
##  [73] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 27  27  27  27  27  27
##  [91] 27  27  27  27  27  27   5+  5+  5+  5+  5+  5+  5+  5+  5+  5+  5+  5+
## [109]  5+  5+  5+  5+  5+  5+  5+  5+  5+  5+  5+  5+  5+ 24+ 24+ 24+ 24+ 24+ 24+
## [127] 24+ 24+ 24+ 24+ 24+ 24+ 31+ 31+ 31+ 31+ 31+ 31+ 31+ 31+ 31+ 31+ 31+ 31+
## [145]  5   5+  5+  5+  5+  5+  5+  5+  5+  5+  5   5+  5+  5+  5+  5+  5+  5+
## [163]  5+  5+  5+  5+  5+  5+ 31  31+ 31+ 31+ 31+ 31+ 31+ 31+ 31+ 31+ 31+ 31+
## [181] 24  24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24  24+ 24+ 24+ 24+ 24+ 24+
## [199] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
## [217] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
## [235] 24+ 24+ 24+ 24+ 24+ 24+ 24  24  24  24  24  24  24  24  24  24  24  24+
## [253] 24  24  24  24  24  24  24  24+ 24  24  24  24+ 24  24  24  24  24+ 24
## [271] 24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24
## [289] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
## [307] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
## [325] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24  24  24  24  24  24
## [343] 24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24
## [361] 24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24
## [379] 24  24  24  24  24  24  24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
## [397] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
## [415] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
## [433] 24  24  24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24  24  24  24+ 24+ 24+ 24+
## [451] 24+ 24+ 24+ 24+ 24  24  24  24  24  24+ 24+ 24+ 24+ 24+ 24  24  24  24
```

```
## [469] 24  24  24  24  24  24  24  24  24  24  24  24  24+ 24+ 24+ 24+ 24+ 24+
## [487] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
## [505] 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+ 24+
## [523] 24+ 24+ 24+ 24+ 24+ 24+ 24  24  24  24  24  24  24  24  24  24  24  24
## [541] 24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24
## [559] 24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24
```

```
fit.data <- summary(biofsurv.fit )
fit.data
```

```
## Call: survfit(formula = biofsurv ~ surv$Strain, conf.int = TRUE, type = "kaplan-meier")
##
##                 surv$Strain=1
##         time       n.risk      n.event     survival      std.err lower 95% CI
##      27.0000      24.0000       2.0000       0.9167       0.0564       0.8125
## upper 95% CI
##       1.0000
##
##                 surv$Strain=2
##  time n.risk n.event survival std.err lower 95% CI upper 95% CI
##     5    288      12    0.958  0.0118       0.9355        0.982
##    24    240     168    0.287  0.0286       0.2366        0.349
##    27     24      12    0.144  0.0326       0.0921        0.224
##    31     12       1    0.132  0.0320       0.0818        0.212
```

```
# Assuming biofsurv.fit is a survfit object
fit.data <- summary(biofsurv.fit)

# Extract desired columns into a data frame
table <- data.frame(
  time    = fit.data$time,
  survival = fit.data$surv,
  std.err  = fit.data$std.err,
  lower95  = fit.data$lower,
  upper95  = fit.data$upper
)

table
```

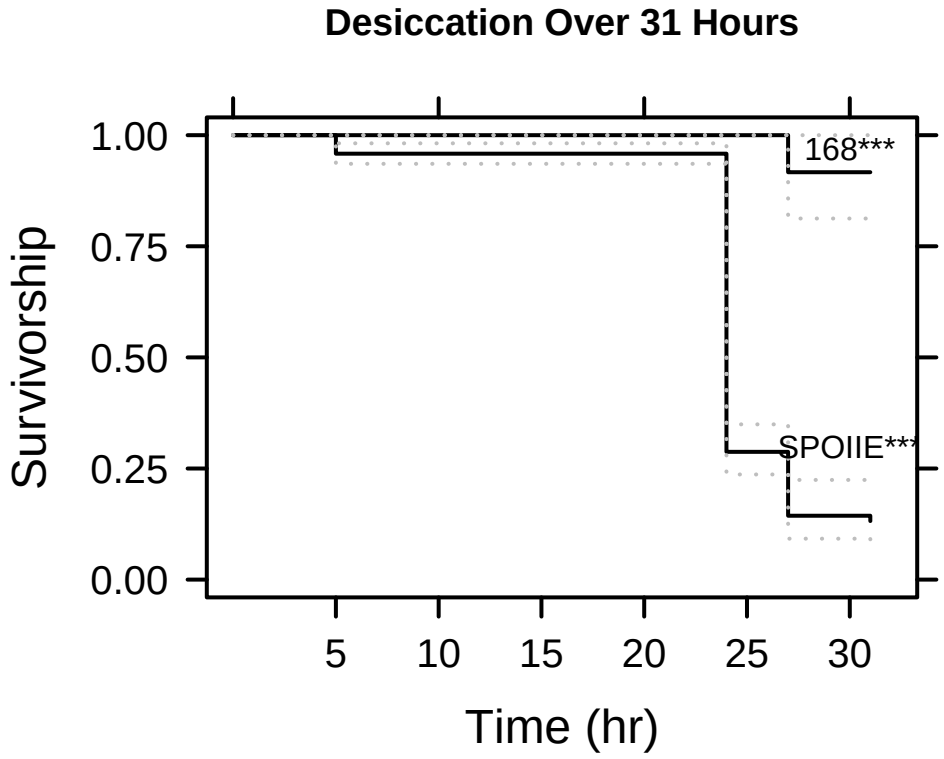
```
##   time  survival    std.err    lower95   upper95
## 1   27 0.9166667 0.05641693 0.81250044 1.0000000
## 2    5 0.9583333 0.01177488 0.93553066 0.9816918
## 3   24 0.2875000 0.02856713 0.23662418 0.3493145
## 4   27 0.1437500 0.03263469 0.09212230 0.2243112
## 5   31 0.1317708 0.03203837 0.08182023 0.2122159
```

```
par(mar = c(5, 7, 5, 7))
plot(biofsurv.fit, conf.int = TRUE, mark.time = FALSE,
  xlim = c(0,32), ylim = c(0,1),
  lty = c(1,3,3,1,3,3),
  col = c("black", "grey", "grey", "black", "grey", "grey"),
  xlab = "Time (hr)",
  ylab = "", cex.lab = 1.5, cex.axis = 1.2, las = 1, lwd = 2,
```

```
  main = "Desiccation Over 31 Hours",
  yaxt = "n", xaxt = "n")
  box(lwd=2)

mtext("Survivorship", side = 2, outer = TRUE, cex = 1.5, line = -3, adj = 0.5)

axis(side = 2, labels = T, lwd.ticks = 2, las = 1, cex.axis = 1.25,
       at = c(0, 0.25, 0.5, 0.75, 1.0))
axis(side = 4, labels = F, lwd.ticks = 2,
       at = c(0, 0.25, 0.5, 0.75, 1.0))
axis(side = 1, labels = T, lwd.ticks = 2, las = 1, cex.axis = 1.25,
       at = c(5, 10, 15, 20, 25, 30, 35))
axis(side = 3, labels = F, lwd.ticks = 2, las = 1, cex.axis = 1.25,
       at = c(0, 10, 20, 30, 40, 50))
text(30, 0.97, "168***", cex = 1)
text(30, 0.3, "SPOIIE***", cex = 1)
```




```
plate.aov <- aov(Event ~ Strain, data = data)
summary(plate.aov)
```

```
##              Df Sum Sq Mean Sq F value Pr(>F)
## Strain        1  63.34   63.34   553.8 <2e-16 ***
## Residuals   574  65.65    0.11
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
plot(biofsurv.fit, fun = "cumhaz", col = c("black", "grey"), lty = c(1, 3), lwd = 2,
     xlab = "Time (hr)", ylab = "Cumulative Hazard", main = "Cumulative Hazard By Strain")
text(29, 0.12, "168", cex = 1)
text(29, 0.7, "SPOIIE", cex = 1)
```